

OR,

A Short and Full View of all the PARTS of the BODY.

Together with
Their several Uses, drawn from
their Compositions and Structures.

By JAMES KEILL, M.D.

Quibus autem expositis, satis docuisse videor, Hominis natura, quanto omneis anteiret Animanteis, ex quo debet intelligi; nec figuram, situmque Membrorum, nee ingenii mentisque vim talem effici potuisse fortuna.

Cicero de Nat. Deor. lib. 2.

The Second Edition, Bebis'd.

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TO THE

Very Learned and Ingenious

EDWARD TYSON,

Doctor of Physick,

Fellow of the College of Physicians, and of the Royal Society,

Physician to Bethlem-Hospital,

AND

Lecturer of ANATOMY at the Surgeons-Hall in LONDON.

SIR,

Would scarce have adventured the Publishing of the following Sheets, if after a particular and A 2 care-

The Epistle

careful Perusal you had not been pleased to Advise and Encourage me to it; and I defire the Favour of prefixing your Name to them, that the World may know your Approbation, which will sufficiently secure me from Censure, and recommend them as containing something Exact and Useful: For your Skill and Judgment in this Subject is well known, and abundantly demonstrated by those Treatises with which you have oblig'd the World, and the Publick Lectures, by which you have adorned the

DEDICATORY.

the Honourable and Useful Office you have held for several Years.

But yet I am not fo Vain as to think there are no Slips nor Errours in this little Treatife, nor will I impose so far upon your Goodness and Civility as to expect your Patronage of them: I only hope, that after your Example, others will be so Candid and Civil as to pass them over.

I do also readily accept of this Occasion, to pay my most bearty Acknowledg-A 3 ments

tames Keil.

Par de s

The Epistle, &c.

ments for your private Favours and Civilities. And as I have a true Esteem for your Merits, so I shall be always ready to shew my self,

Your most Humble and

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ha oslipe nor Errours in this

most Obliged Servant,

James Keill.

A

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entire of all a volume.

A TOMY

Humane Body

ABRIDG'D.

CHAP. I.

Of the Component, External, and Common Parts of the Body.

SECT. I.

Of the Component Parts.

Purposely pass over the various Definitions of a Part, as being of no great Ule; and for the same reason I will not trouble the Reader with the feveral Divisions which Anatomists make of the Parts of the Humane Body. It is sufficient to know, that all All the Pa the Parts are made up of Threads or are made Fibres, of which there be different kinds; of Fibres.

for there are some soft, flexible, and a little elastick, and these are either hollow like small Pipes, or spongious and sull of little Cells, as the nervous and fleshy Fibres; others there are more solid flexible, but with a strong Elasticity or Spring, as the Membranous and Cartilaginous Fibres: and a third sort are hard and inslexible, as the Fibres of the Bones. And of all these, some are very sensible, and others are destitute of all sense; some so very small as not to be easily perceived; and others, on the contrary, so big as to be plainly seen.

Now these simple Fibres do first constitute the Substance of the Bones, Cartilages, Ligaments, Membranes, Nerves, Veins, Arteries and Muscles. And again, by the various Texture and different Combination of some or all these Parts, the more compound Organs are framed; such as the Lungs, Stomach, Liver, Legs and Arms, the summ of all

which make up the Body.

SECT. II.

Of the External Parts.

Division be Body.

THE Body is divided into Four Principal Parts, which are, the Head, the Thorax, the Abdomen, and the Extremities, viz the Arms and Legs.

The

The External Parts of the Head or The External Upper Cavity, are, the Face, and the Parts of Calva or Hairy Scalp. The Parts of the Face, are, the Brow, the Ears, the Eyes, the Cheeks, the Nofe, the Philtrum and its sides, the Mustaches, the Lips, the Mouth, and the Chin. The Parts of the Hairy Scalp, are, the Sinciput or Fore head, under which lieth the Os Frontis; it reaches to the Bpeffere, or meeting of the Coronal with the Sagittal Suture. The Vertex or Crown of the Head, is where the Hairs turn, as it were, round a Point; and from thence to the first Joint of the Neck is the Occiput or Hind-head. The Temples or the Sides of the Hairy Scalp, under which are the Crotaphite Muscles, the Offa Petrofa; they reach to the Sutura Squammola.

The External Ear is divided into Two of the Parts, of which the upper is call'd Pinna or the Wing; the lower Fibra or Lobe. The Parts of the Pinna are the Helix, which is the outward circle or border of the Ear; the Anti-helix, which is the Semi-circle within the other: The lower end of this Semi circle makes a little Prominence, which is call'd Anti-tragus; because there is another Prominence just opposite to it, which is call'd Tragus, by reason of some Hair that is upon it. The Cavity made by the Anti-helix is call'd

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Concha:

Cincha: The Hole in the middle of the Ear, which goes to the Tympanum, is call'd Alvearium.

be Eyes.

No se.

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The External Parts of the Eyes, are the Supercilia or Eye-brows, the Canthus Internus or the Great Angle, where the Caruncula Lachrymalis is; the Canthus Externus or the Little Angle, which is the furthest from the Noie; the Palpebra or the Upper and Lower Eye-lids; the Cilia, which are little Cartilages on the Edge of the Eye-lids; the Hairs planted upon the Cilia in form of a Pallisado; the Puncta Lachrymalia, which are two little Holes near the big Angle of the Eye. The Orbite is a Cavity made by the Bones, in which the Globe of the Eye is contained, with its fix Muscles; the Tunica Conjunctiva, which is the White of the Eye; the Cornea. which is the Transparent Part of the Eye; the Iris or Rain-bow, in the middle of which is the Papilla or Sight.

The Nose has its Spina or Ridge; it reaches from the Brow to the Cartilage Acromion. The Acromion reaches from the end of the Spine to the Globulus or tip of the Nose. The Nostrils are the Passages into the Nose. The Ala or Wings of the Nose are the sides of the Nostrils. The Columna is the little sleshy Portion, which reaches from the tip of the Nose to the Philtrum; it di-

vides

vides the Nostrils. The Philtrum is the little Canal which comes from the lower part of the Nose upon the upper Lip. The Cheeks reach from the lower Eyelids to the Lips. The Mentum or Chin is the fore-part of the Lower-Jaw. The Lower-Jaw reaches from the two Ears to the Chin inclusively. The Lips are the musculous Flesh at the entry of the Mouth; their External Part is call'd Prolabium, and that which is tinctured red, Prostomia. The Gums are the Flesh which cover the lower part of the Teeth.

The Neck reaches from the Head to of the the Clavicula or Chanel Bones. Its Parts are the Throat, which is its fore-part, along which descends the Trachea Arteria or Wind-pipe, and the Oefophagus or Gullet. The Pomum Adami is the Eminence which appears in the upper part of the Throat. The Cervix is the hind-part of the Neck; its upper-part is call'd Lophia, the middle Fossa, and the lower Epomis. The Parotides make the upper and lateral-part of the Neck, Terthra the middle, and Paralophia the lower. All that lies betwixt the Bafis of the Neck and the Diaphragma or Midriff, that is, down to the last Ribs, of the is call'd the Thorax or Chest. The fore-the The part of the Thorax is call'd the Breaft; or Mids in it are the Clavicule or Chanel-Bones; vity.

B 3

and

and the Sternum or Breast-Bone, which is in the middle; it begins at the Clavisule, and terminates in the Cartilago Xiphoides or Sword-like Cartilage. Under the Sternum lies the Mediastinum, and the Heart in its Pericardium. The Mamma or Dugs are two round Tumours which appear upon the fore-part of the Cheft, under which are fituated part of the Ribs, the Pleura, and the Lungs: There stands upon their Centre a little Protuberance call'd Papilla or Nipple, which is encompassed with a reddish circle call'd Areola. The hollow in the middle of the Breaft, below the Dugs. is called Scrobiculus Cordis. The hinderpart of the Thorax is call'd the Back. composed of Twelve Vertebra or Joints. and Two Scapula or Shoulder-blades. which are the two upper Parts of the Back on the fides of the Vertebra. The lateral Parts of the Thorax are call'd Peristerna.

der- The Lower Belly extendeth from the Cartilago Xipboides to the Os Pubis; the fore-part is call'd Abdomen, and the hindpart the Back side. The Abdomen is divided into Upper, Middle, and Lower Parts. The Upper reaches from the Cartilago Xiphoides till within two Fingers breadth above the Navel; it is calld Epigastrium, and its two fides Hypochondria: The Right covers the greatest part

part of the Liver; the Left the Spleen. part of the Stomach, and Colon. The Middle-part of the Abdomen is only two Fingers breadth above, and as much below the Navel; it is call'd Regio Umbilicalis; its middle is call'd Umbilicus or Navel. Under the middle of this Region lies all the Intestinum Jejunum, and part of the Ilium. The fides of this Region are call'd by Glisson, Epicolica, because they cover the Colon. Under the Right is contain'd the Right Kidney, part of the Colon and Jejunum: under the Left is contained the left Kidney, with part of the Colon and Jejunum. The Lower-part of the Abdomen reaches from the Umbilical Region to the lower-part of the Os Pubis; it is call'd the Hypogastrium; it covers the Bladder, Womb, and the Rectum or Straight-Gut. The Lower-part of the Hypogastrium is call'd Petten or Regio Pubis; its sides Inquina or Groins. The sides of the Hypogastrium are call'd Ilia, either because they contain almost all the Gut Ilium, or because they terminate at the lower-part of the Os Ilium. The Inquina or Groins are below the Ilia, where there is a part of the Muscle Cremaster, with the Productions of the Peritoneum. The hind part of the Abdomen is call'd the Back-fide; · it reaches from the last Ribs to the Extremity of the Os Sacrum. It is divided B 4 into

into two parts, the upper is call'd the Small of the Back, its fides the Loins; the middle of the lower part is call'd Radius; at its lower end is the Anus, and its fides the Nates or Buttocks. The Perinaum is the space between the Anus and the Scrotum in Men, and the Vulva in Women.

elExter- The External Parts of Generation proper to Men are the Yard and the Scrotum. The Extremity of the Yard is call'd the Glais: The Prapatium or Fore skin is the Skin doubled which covers the Glans like a Hood. Frenum or Bridle is a little whitishcolour'd Ligament which ties the Foreskin and the Glans together beneath. The edge of the Glans where the Praputium begins, is call'd Corona or Crown. The Vrethra is the Canal which runs along the under fide of the Yard, through which the Seed and the Urine pass. The Rapha or Ridge is a Line which running along the under-fide of the Yard, divides the Scrotum and Perinaum in two; its length is from the Franum to the Anui. It is not ordinarily cut, in the Operation for the Stone; first, because it's harder than any other part of the Skin there, and then you cut upon the Interfices of the Muscles, which make the re-union the difficulter. The Scrotum is the Purse which contains the two Testicles. The

The External Parts of Generation of the Exte proper to Women, are the Vulva or great Generation Chink situated below the Os Pubis, and Women, covered with Hair; above this, there is a little Swelling made by some Fat under the Skin, which is call'd Mons Veneris. The Labia or Lips of the great Chink are only the Skin swelled by some Fat underneath; these being a little separated, there appear the Nympha, one on each fide of the Chink; they are two small pieces of Flesh resembling the Membranes that hang under the Throats of Pullets. In the Angle of the great Chink next the Os Pubis, is the Extremities of the Clitoris, covered with a little Hood of the Skin call'd Praputium. A little deeper, in the fame fide of the Vulva there is a little Hole, which is the Orifice of the Neck of the Bladder. On the opposite side, next the Anus, are Glandula Myrtiformes, situated in the Fossa Magna or Navicularis, and in this Angle of the Chink there is a Ligament call'd the Fork, which is torn in the first Birth!; or more dainwantoo I ent do

The Arm is from the Joint of the of the Eshoulder to the Elbow, which is the rail Party place where we bend our Arm. The Fore-arm is from the Elbow to the and Ham Wrift or Carpus. The Hand is all that which is betwixt the Wrift and the ends of the Fingers. The Parts of the Hand

B 5

are the Metacarpus, which is from the Wrist to the root of the Fingers; the outfide, which is the Back of the Hand; and the infide, which is the Palm of the Hand; the Mons Iwest is the fleshy part of the Hand nigh the Thumb; the Finger next the Thumb is call'd the Index or Fore-finger, then follows the Middle, the Ring-finger, and the Little one. Upon the Exremities of the Fingers are the Nails; the white Spot which is at the root of the Nails is called Onyx.

he Exter. The Thigh is from the Haunch to bigh and that Joint of which the Fore-part is call'd the Knee; the Back-part the Ham.

25.00

The Leg is from the Knee to the Tarfus; its Fore-part is call'd the Shin, and the Back-part the Calf of the Leg: The Eminences which are at the Extremity nigh the Tarfus, are call'd the Ankles of the Foot; they are two, the Outer and Inner: The Tarfus is from the Ankles to the Metatarfus, or breadth of the Foot, which goes to the root of the Toes: The upper-part of the Foot is call'd Instep, the under-part the Sole of the Foot; the Toes are Five in number, with their Nails.

where he between the way of a contribution of chairs

HE first and outermost Covering of the Body is the Cuticula or Scarfskin, by the Greeks call'd 'Emdenus. This is that foft Skin which rifes in a Blifter. upon any burning, or the application of a Blistering Plaister. It sticks close to the surface of the true Skin, to which it is also tied by the Vessels which nourish it, though they are so small as not to be feen. When we examine the Skarf-skin with a Microscope, it appears to be made up of feveral Lays of exceeding small Scales, which cover one another, more or less, according to the different thickness of the Skarf-skin in the feveral Parts of the Body. In the Lips, where the Scales appear plainest, because the Skin is thinnest, they only, in a manner, touch one another. Now these Scales are either the Excretory Ducts of the Glands of the true Skin, as, I think, is apparent in Fishes, or else these Glands have their Pipes opening between the Scales. - Lemenhoeck reckons that in One Curicular Scale there may be Five hundred Excretory Chanels, and that a Grain of Sand will cover Two

Two hundred and fifty Scales; so that One Grain of Sand will cover One hundred twenty five thousand Orifices through which we daily perspire.

The Scales are often glewed to one another by the grosser parts of our insensible Transpiration, hardening upon them by the heat of our Body, which carries off the more volatile Particles. The Humour which is afterwards separate by the Glands of the Skin, being pent in between the Scales, causes frequent stchings; and where the Matter has been longer pent up, small Pimples; for the removing of which, Nature directs us to those wholsome Remedies of frequent Rubbing, and Washing or Bathing.

The Use of the Scarf-skin is to hinder the Bodies which we touch from making a too exquisite and painful impression on the Nerves of the Skin, and to keep

them always loft and moist.

SECT. IV.

WE remark in the Skin, the Skarf-skin being raised, Three Parts. The First is, an infinite number of Papilla Pyramidales; they are the Ends of all the Nerves of the Skin, each of which are enclosed in two or three Covers of a Pyramidal Figure, and these Covers are each

each above another. They may be eafily feen and separated in the Skin of an Elephant, and in the Skin of the Feet of feveral other Animals. Between these Papille are an infinite number of Holes, which are nothing but the Orifices of the Excretory Vessels of the Miliary Glands underneath. The Second Part is a Web of Nervous Fibres and other Vessels differently interwoven, it is always covered with a mucous Substance. which ferves to support and moisten the Papilla Pyramidales, and it is the Parenchima or that part of the Skin that the Parchment is made of. The Third Part is an infinite number of Miliary Glands, about which there is much Fat; they lie under the other two Parts, they feparate the matter of Sweat and infenfible transpiration. Each Gland receives a Nerve and Artery, and fends out a Vein and Excretory Vessel, which last passes through the other two Parts to the Cuticula, for the discharging the Body of this Matter, and for the moistening the Cuticula and the Papilla Pyramidales, that they may not be dry, which would very much hurt the Sense of Touching. Upon the furface of the Skin there are many Parallel Lines, which are cut by as many Parallel ones. These Intersections make spaces of a Rhomboidal figure; and upon the Ends of the Fingers these. Lines Siz

Thickness be Skin.

Lines are Spiral. There is a Pore. with a Hair, in the most part of the Intersections; the more there are of these Lines, and the deeper they are the rougher and the more wrinkled is the Skin. The Skin is fix times thicker than the Scarf-skin: And in the Sole of the Foot it is much thicker than in the Face, Hands, and other Parts. In the Summer it is thinner and fofter, because the Pores are wider. In the Winter it is more compact and harder, because the Pores are more close; therefore the Hairs" of Bealts stick taster, and Furs made of them are better in that Season. In some the Skin is white, in others black and tauny, which probably comes from the different Colours of the Mucofity which covers the Parenchima of the Skin; for the Fibres of the Skin in all are white, and there is little or no difference in the colour of different Bloods. Its Use is Use of the to cover and wrap up all the Parts of the Body, to be the Organ of the Sense of Touching, and the Emunctory of the whole Body; for through the Glands of the Skin pass not only such Particles of the Vessels as decay by reafon of the continual motion of the Blood, but likewise the greatest part of the Liquors which we drink; which having perform'd part of their office in conveying the Aliments into the Blood,

are, in the next place, to dissolve the Saline and Terrestrial Particles to be carry'd off through the Glands of the

Skin and Kidneys.

Now the Summ of all these Particles strain'd through the Cuticular Glands, is by Sanctorius reckon'd to amount to about Fifty Ounces a Day: so that suppose a Man's Body to weigh 160 Pounds, then in 51 Days we perspire a quantity equal to the weight of the whole Body: But in what time, or if ever the whole Substance of the Body is changed, is no ease Matter to determine.

Of the Hair.

THE Hair may justly be reckon'd one of the common Teguments of the Body, not only for its Use, but also because it is to be found upon all the Parts of the Body, except the Soles of the Feet, and Palms of the Hands. It grows longest upon the Head, Beard, in the Arm-pits, and about the Privities. When we examine the Hairs with a Microscope, we find that they have each a round bulbous root which lies pretty deep in the Skin, and which draws their Nourishment from the surrounding Humours; that each Hair consists of five

or fix others wrapt up in a Common Tegument or Tube. They grow as the Nails do, each part near the root thrusting forward that which is immediately above it, and not by any Liquor running along the Hair in Tubes, as Plants grow. Their different Colours depend much upon the different temperaments and quality of the Humours that nourish them. The Use of the Hairs is for a Covering and Ornament to the Body. Whatsoever the Efficient Cause may be why a Man has a Beard, and a Woman none, it is certain, the Final Cause is for the distinguishing the Male from the Female Sex, which otherwise could hardly be known, if both were dress'd in the fame Habit.

S E C T. VI. Of the Fat.

D'Nderneath the Skin there lies a Membrane call'd the Membrana Adipofa, which, by the help of a Microscope, appears to be composed of an infinite number of fine transparent Vesicles or Bladders, into which the Blood-Vessels that are spread upon them deposite the oily and sulphureous part of the Blood, which in these membranous Cells we call Fat.

Malpighius

Malpighius mentions a Net of small The Vessels of Vessels, which he calls Ductus Adiposi, the Fat. because they are full of Fat; these, he fuppoles, bring the Fat into the Cells; but he could never discover from whence they take their rife. There are also a number of little Glands, which are accompanied with Lymphatick Vessels, which carry back any Serofity that is

superfluous.

The Fat is to be found immediately under the Skin, in all the Parts of the Body, except in the Fore-head, Eyelids, Lips, upper part of the Ear, Yard, and Scrotum. In some the Vesicles of the Membrana Adiposa are so full, that the Fat is an Inch or an Inch and an half thick, and in others they are almost flat, containing little or no Fat. There are two forts of Fat, one white, Two forts of or rather Yellow, foft, and lax, which Fat. is easily melted, call'd Pinguedo; another white, firm, brittle, and which is not easily melted, call'd Sevum or Tallow. Some reckon the Marrow of the Bones for a third fort of Fat.

The chief Use of the Fat is to blunt The Use of and sweeten the too great sharpness and the Fat. Acrimony of the Salts which are in the Blood. It is likewise of Use sometimes for the Nourishment of the Body. Hence it is that some Creatures live, during a whole Winter, without any other Food.

Of the Membrana Adipola, &c.

It serves also to moisten and souple the Parts, for facilitating their Motion; to fill up the Interstices of the Parts, that the Skin may be smooth and beautiful; to defend the Body against external Cold; and, in fine, to hinder too great a dissipation of the Spirits.

SECT. VII.

Of the Membrana Adipola, Carnola, Communis, and Propria Musculorum.

Vost a Mem-

A Membrane is a Web of several forts of Fibres interwoven, for the covering and wrapping up of some Parts. Their membranous Fibres give them an Elasticity, whereby they can contract and closely grasp the Parts they contain, and their nervous Fibres give them an exquisite sense, which is the cause of their contraction; therefore they can scarcely suffer the sharpness of Medicines, and they are difficultly united, where there is a solution of continuity, or loss of their Substance. In their texture there are a number of small Glands, which separate an humour fit for moistening the Parts which they contain. Those that cover the folid Parts, are properly call'd Membranes; and they have their particular Names, as the Peritoneum, which wraps up all that is contained in the Abdomen; the Pleura that

A distinction Membranes. that which is in the Thorax; the Periosteam the Bones, and the Pericardium the Heart. Those which form the Coats of Vessels, and which contain the Humours, as those of the Veins, Arteries, Stomach, Bladder, Intestines, Testicles, &c. are call'd Tunicles or Coats: And those which cover and embrace the Brain, as the Dura, and the Pia Mater, are call'd Meninges. Of all these kinds of Membranes, some are thin, and some are thick; and the fame Membrane is thick in some places, and thin in other places, as in the Membrana Adipola, which is thicker in the Neck than in any other part of the Body. The Use of the The Use of the Membranes is to cover and wrap up the Membranes Parts; to strengthen them; to fave them from external injuries; to preserve the Natural Heat; to join one Part to another; to fustain small Veffels, and the Nerves which run through their Duplicatures; to stop the returning of the Humours in their Vessels, as the Valves stop the returning of the Blood in the Veins and Heart; of the Chyle in the Lacteals and Thoracick-Duct'; and of the Lympha in the Lymphatick Veffels.

By the Membrana Adiposa, is most The Membra commonly understood that part of it and Carnosa. only which lies next the Flesh, and which contains but little Fat in its Cells:

Cells; and therefore appearing more Membranous than the rest, is said to be the Basis of the Cellula Adiposa. And even some part of this hath been taken by Anatomists for the Membrana Carnofa, upon the account of its Redness; for here the Blood Vessels lie very thick, the Veficles not being diftended with Fat.

of the Memrana Comnunis Muscurum.

of the Memtufculorum.

f the Memana Comunis Valcuorum.

Anatomists do generally affert, That there is a Membrana Communis Musculorum, being led into that Mistake by the Aponeurosis of several Muscles; whereas, upon stricter Observation, there is no fuch thing to be found. The Membrana orana Propria Propria Musculorum is that which covers immediately all and every one of the Fibres of a Muscle, and is closely attacked to them. There is another call'd Membrana Communis Vasculorum, which is a thin Membrane, and accompanies almost all the Vessels of the Body. All these Membranes receive Veins, Arteries and Nerves from the Parts which are nearest to them. sale to the sale bas sale Vasilt of

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only which his next the glesh, and which concerns but fittle Latin its

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CHAP. II. Of the Lower Belly.

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SECT. I. Of the Muscles in General.

Muscle is a bundle of fleshy and The Definition often tendinous Fibres, of which of a Mufcle. all in the same Plane are Parallel to one another, and they are all enclosed by one proper Membrane. The Fleshy of the Flesh Fibres compose that Part which is call'd Fibres. the Body or Belly of the Muscle; they are red, lax, and spongious, containing a number of small Cavities, they are tied together by a number of small and short Threads, which go from Fibre to Fibre, call'd Membranous Fibres. The Ten- of the Tendis dinous Fibres compose the two Extremi- nous Fibres. ties; they are call'd the Head and Tail. or the two Tendons of the Muscle; they are white, hard, compact, and closely bound together, that which makes them less than the Body of the Muscles. every Tendon there are many tendinous Fibres, as there are fleshy Fibres in the body of the Muscle; so that every fleshy Fibre answers, at both ends, to a tendinous Fibre, to which they are always join'd

join'd obliquely, making equal and alternative Angles.

The Division

Muscles are either Simple or Composed: The Simple have all their Fibres Parallel, and in the same Direction. The Composed have the Fleshy Fibres of several Planes croffing one another, or of different Directions; and they may be divided into as many Simple Muscles as there are Planes, whose Fibres have different Directions. Each Plane relembles a Rhomboides, or Lozenge. The Strength of a Muscle confifts in the Union of many Fibres. The Motion of a Muscle is always towards its Centre. The Tendons are sometimes double and triple, as the Biceps and Triceps. Sometimes feveral Muscles join in one Tendon, as the Tendo Achillis. Sometimes one Muscle has two Bellies, as the Digastricus.

We find also Muscles without Tendons, as the Quadratus of the Fore-Arm, and several of the Face, Tongue, and Lower-Jaw; and they are only inserted into the Periosteum: whereas those that have Tendons are inserted into the body of the Bone. There are others which have only Tendons at one end, as may be seen in the Myology. This makes me suspect that Tendons are only for the conveniency of having a great number of Fibres inserted about a small Bone. Those who would have a more particular Descrip-

tion

an

Of the Muscles of the Lower Belly. tion of a Muscle, may consult Steno, and Borelli.

The Muscles have Nerves, Veins, Arteries, and Lymphaticks, as other Parts; their Use is to bend and extend, and to perform all the motions of the Parts.

SECT. II.

Of the Mufcles of the Lower Belly.

HAving raised the Skin and Fat, the Muscles of the Lower Belly appear, which are Five Pair in number : The First of which that prefents it felf, is the Obliquus Externus or Descendens; it obliquus Extakes its Origination from the two last ternus. true, and the five false Ribs, by five or fix Digitations, the four uppermost of which lie between the teeth of the Serratus Anticus Major; its Fibres, descending obliquely, are inferted all along the Linea Alba under the Musculi Recti, to the upper and fore-part of the Spine of the Ilium, and to the fore-part of the Os Pubis. It has a large Aponeurofis, or tendinous Expansion, which covers both its telf, and the Musculi Recti. The Linea Alba is a Line which reaches betwixt the Cartilago Xiphoides and the Os Pubis, made by the union of the Tendons of the Oblique and Transverse Muscles, dividing the Abdomen in two in the

24 Of the Muscles of the Lower Belly.

the middle. This Muscle receives a twig of a Nerve from the Intercostals at each :

of its Digitations.

bliquus In-

renfuerfalis.

The Second Pair is the Obliquus Ascendens or Internus, whose Fibres are dispofed in a contrary manner, croffing the former obliquely; they arise with a large and fleshy beginning, from the Circumference of the Ilium, from the Os Pubis. Above they are fixed to the Cartilaginous Part of the False Ribs, and they are inserted all along the Linea Alba.

The Third Pair is the Transversalis; it lies under the two former; it arises from the Cartilago Xiphoides, from the Extremities of the False Ribs, from the transverse Apophises of the Vertebra of the Loins; it is fixed to the inner fide of the Spine of the Ilium, and is inserted in the

Os Pubis, and Linea Alba.

These Three Muscles unite their Tendons as they approach the Linea Alba; they are pierced in the middle of the Linea Alba, for the Passage of the Umbilical Vessels. They are also pierced above the Os Pubis, for the passage of the Spermatick Vessels in Men, and the round Ligaments of the Womb in Women. These Holes are not opposed to one another; that which is in the Transversal is highest, that in the Obliquus Ascendens is a little lower, and that in the Obliquus Descendens lowest. It is this

The Fourth Pair, which is cover'd with the Aponeurosis of the Obliqui, is the Musculus Rectus; it arises from the Ster- Rectus. num, the Extremity of the last two true Ribs, and goes straight down the forepart of the Abdomen to be inserted in the Os Pubis. This Muscle has three or four Innervations, which, when the Muscle acteth, serve to render the compression equal, which otherwise would be all in the middle. It has Veins and Arteries, which creep on its infide, from the Mammillary and the Epigastrick Vessels, which communicate, that the Blood may return by the Mammillary Veins, when the Passage is stopt by the Epigastrick. which are compressed in Women big with Child.

The Fifth Pair is the Pyramidalis, so Pyramidalis call'd because of their Figure: they rife with a fleshy beginning, from the outer and upper part of the Os Pubis, and growing narrower and narrower, are inferted in the Linea Alba, sometimes near to the Navel. Sometimes one, and sometimes both of these Muscles are wanting. The Use of all the Muscles of the Lower- The Use Belly is to compress all the Parts that it these Muscle contains, for the filtration and distribu-

tion of the Chyle, for the expulsion of the Excrements, and to hinder the Air from rushing in by its Elasticity, and distending the Stomach and Guts; all of them help the expiration, by making the Diaphragma mount up; and the Obliqui help to pull down the Ribs, for the contracting of the Thorax; they help to bend the Trunk forwards. By the admirable contrivance of their Fibres decustating one another, every point of the Lower Belly is sufficiently compress'd, so as that the Intestines can slip no where from the Compression.

SECT. III.

of the Peritonaum.

es Descrip-

Immediately under the Muscles of the Lower Belly appears the Peritonaum. It is a thin and soft Membrane, which encloses all the Bowels contained in the Lower Belly, covering all the inside of its Cavity. Its External Superficies is unequal where it adheres to the Transverse Muscles. The Internal is very smooth and polish'd. It has a number of small Glands that separate a Liquor, which supples the Intestines, and facilitates their motion. When these Glands are obstructed, the Peritonaum grows thick, as may be seen in several Dropsies.

The

The upper-part of this Membrane covers the Midriff, to which it closely adheres; the fore-part of it sticks to the Transverse Muscles, and Linea Alba; the lower-part of it to the Os Pubis; and the back-part of it to the Os Sacrum, and Vertebra of the Loins. Tis a Double Membrane, and contains in its Duplicatures the Umbilical Vessels, the Bladder, the Ureters, the Kidneys, and the Spermatick Vessels, to all which it gives a Membrane, as also to the Liver, Spleen, Stomach, Intestines, and Womb.

Its External Lamina has two Pro-its Productions, like to two Sheaths, which pass disms. through the Rings of the Oblique and Transverse Muscles in the Groin, for the passage of the Spermatick Vessels in Men, and for the round Ligaments of the Womb in Women. These Productions being come to the Testicles in Men, dilate and form the Tunica Vaginalis. The Internal Lamina, which is here very thin, having accompanied the External Productions a little way, cleaves close to the Spermatick-Vessels, and round Ligaments of the Womb.

The Peritonaum has Veins and Arteries Its Vessels. from the Phranica, from the Mammillary, the Epigastrick, and often from the Spermaticks. Its Nerves are of those which are distributed in the Muscles of the Abdomen. It has likewise a few Lympha-

C 2 ticks,

Of the Omentum.

ticks, which discharge themselves into the Iliack Glands. By the elasticity of its Fibres, it easily dilates and contracts in Respiration and Conception. It it breaks, it causes a Rupture either in the Groin or Navel. Its Use is to contain the Bowels of the Abdomen, and to give each of them an outer coat.

SECT. IV.

Of the Omentum:

7 Hen the Peritonaum is cut, as isufual, and the Cavity of the Abdomen laid open, the Omentum or Cawl presents it felf first to view. This Membrane covers the greatest part of the Guts; for one end of it running a-cross the upper part of the Abdomen, is tied to the hollow fide of the Liver, to the backfide of the Duodenum, to that part of the Colon that lies under the Stomach, to the Back and Spleen; from thence descending below the Navel, it turns up again and ascends as high as the Stomach, where its other Extremity is again tied to the hollow fide of the Liver, to the forepart of the Duodenum and Pylorus, to the bottom of the Stomach and to the Spleen. Thus floating double upon the surface of the Guts. it was by the Greeks call'd Eminhwov. Sometimes it descends as low as the

Descrip-

Os Pubis, within the Productions of the

Peritonaum, causing an Epiplocele.

Now the Cawl is a most delicate and fine Double Membrane, interlarded, for the most part, with a great deal of Fat which lines each fide of its Blood-Vessels. These are Veins from the Porta, call'd Gastro-epiplois dextra & sinistra, Arteries from the Caliaca. The Intercostal Nerve, and the Par Vagum, fend it several twigs of Nerves. All these Vessels, with some small Glands, accompanying one another, spread their Branches very curiously upon the Cawl, and even to the minutest twig; they run between two lines of Fat, which are bigger or smaller, according to the weight of the Cawl. It has been sometimes found to weigh Fifty Pounds, but ordinarily it does not much exceed Half a Pound. Where there are no Vessels, the Membrane of the Cawl is very fine, transparent, and pierced with a number of small holes.

They give several Uses to the Cawl, as Its VA to cover the bottom of the Stomach and the Intestines; that by cherishing their heat, it may promote Digestion, and help the Concoction of the Chyle; to strengthen and sustain the Vessels which go from the Spleen to the Stomach, Inftore of the Fat, that it may be received by the Veins and Lymphaticks, for the

Of the Oesophagus.

Use we have spoken of; to grease the Superficies of the Guts, for facilitating their Peristaltick Motion.

SECT. V.

Of the Oesophagus.

Though the Oesophagus and Ductus Thoracicus lie not in the Lower Belly; yet, that I may at once show the intire Passage of the Aliments from the Mouth to the Blood, I shall describe them both

in this Chapter.

The Oesophagus, or Gullet, is a long, large, and round Canal, which descends from the Mouth, lying all along betwist the Wind-pipe and the Joints of the Neck and Back, to the fifth Joint of the Back, where it turns a little to the right, and gives way to the Aorta Descendens, and both run by one another, till at the ninth the Oesophagus turns again to the left, climbs above the Aorta, and descending above it, it pierces the Midriff, and is continued to the left Orifice of the Stomach.

The Gullet is compos'd of Three Coats.
The First and outermost is only a common Membranous Integument, which feems to be a continuation of the Pleura.

The Second is thick and fleshy: Its Fibres are truly Muscular. In Brutes, because

Cast

tuation.

because the situation of their Neck conduces little to the descent of the Aliments, therefore these Fibres run in two close Spiral lines which cross one another. But in Men whose Position is Erect, they run only a little obliquely from the upperend of the Ocsophagus to the Stomach, into which, by a gentle contraction, they easily thrust the descending Aliments.

The Third and last lines the Cavity of the Gullet. It's compos'd of white and slender Fibres diversely interwoven. At its upper end it is continued to the Membrane that covers the Mouth and Lips, therefore, in Vomiting, these Parts are affected. Its lower end covers the lest Orifice of the Stomach two or three fingers breadth. The Surface of this Membrane is besmeared with a soft and slimy Substance, which probably comes from some small Glands that lie between this Coat and the Second.

The upper end of the Gullet is call'd no Muscles of the Pharynx. It has Two Pair of Muscles of the Pharyngans. This is a small and round Muscle, which arises fleshy from the root of the Processus Styloides, and descending obliquely, it is inserted into the sides of the Pharynx. When this Muscle acteth, it pulleth up and dilateth the Pharynx, in Deglutition.

The

The Second is the Oefophageus. Its Fibres have several Directions; its superiour Fibres arise from the Processus Pterigoidans of the Os Sphænoides, and from the Cornua of the Os Hyoides, and run obliquely to the back-part of the Pharynx. The Fibres which are below thefe arise from the sides of the Cartilago Scutiformis, and run transversely to the middle of the back-part of the Pharynx, where both Superiour and Inferiour Fibres from both fides unite and form a Tendinous Line. When this Muscle acts. it draws the back-part of the Pharynx to its fore part; by which it not only Araitens it for the depressing of the Aliment, but it compresses also the Tonsilla which fend out their Liquor, which lubricates the Aliment, whereby it glides the more eafily down into the Stomach.

There are two Glands which are tied on the back-side of the Gullet about the Fifth Vertebra of the Back, by the branches of Nerves which come from the Eighth Pair. These two Glands are like two Kidney-beans tied together; they receive Veins and Arteries from the Coronaria, and they have Lymphatick Vessels which discharge themselves into the Thoracick Duct. Bartholine remarks, that these Glands sometimes swell so big, as to hinder the descent of the Aliments into the

Stomach.

Glands.

The

The Gullet at its upper end receives an Artery from the Aorta, and it sends a Vein to the Azygos: at its lower end it has an Artery from the Coeliaca, and it gives a Vein to the Coronaria of the Stomach. Its Nerves are from the Eighth Pair.

The Use of the Gullet, is to carry the we were. Meat from the Mouth into the Stomach, by means of the Muscles of the Pharynx, and Fleshy Fibres of the Gula, which

perform its Peristaltick Motion.

SECT. VI.

Of the Stomach.

THE Stomach, Ventriculus, or Tasus, Its Sienat lies immediately under the Midriff; the Liver covers a part of its right Side. the Spleen touches it on the left Side. and the Colon at its bottom, to which also the Cawl is tied. Its figure resembles to Figure a Bag-pipe, being long, large, wide, and pretty round at the bottom, but shorter and less Convex on its upper part, where it has two Orifices, one at each end, which are fomewhat higher than the middle between them. The left Orifice is call'd Kagdia, to it the Oesophagus is joined. By this Orifice the Aliments enter to orifice. the Stomach, where being digested, they ascend obliquely to the Pylorus or right Orifice,

Orifice, which is united to the first of the Intestines. At this Orifice the Tunicles of the Stomach are much thicker than they are any where else, and the inmost has a thick and strong Duplicature in form of a Ring, which serves as a Valve to the Pylorus when it contracts and shuts.

ts Coats.

The Stomach is made of four Membranes or Coats. The First and inmost is made of short Fibres, which stand perpendicularly upon the Fibres of the next Coat; they are to be feen plainly towards the Pylorus. When the Stomach is distended with Meat, these Fibres be-come thick and short. Whilst they endeavour to restore themselves by their natural Elasticity, they contract the Cavity of the Stomach, for the Attrition and Expulsion of the Aliments. This Coat is much larger than the rest, being it is full of Plaits and Wrinkles, and chiefly about the Pylorus: These Plaits retard the Chyle, that it run not out of the Stomach before it be sufficiently digested. In this Coat there are also a great number of fmall Glands which separate a Liquor which befmears all the Cavity of the Stomach; therefore this Coat is call'd Tunica Glandulosa.

The Second is much finer and thinner; it is altogether Nervous; it is of an Exquisite Sense, and it's call'd

Nervosa.

The Third is Muscular, being made of straight and circular Fibres; the straight run upon the upper part of the Stomach, between its superiour and inferiour Orifices; and the circular run obliquely from the upper part of the Stomach to the bottom. These Fibres, by their Contraction and continual Motion, help the Attrition and Digestion of the Aliments.

The Fourth Tunicle is common; it

comes from the Peritonaum.

The Stomach receives Veins from the Porta, viz. the Gastrica, Pylorica, and to vessels. Vas Breve, and branches from the Gastro-epiplois dextra & sinistra, which are accompanied with branches of the Arteria Coliaca, all which lie immediately under the fourth Coat. of the Stomach.

The Eighth Pair of Nerves, or Par Vagum, gives two considerable branches to the Stomach, which descending by the sides of the Gullet, divide each into two branches, the External and Internal. The two External branches unite in one, and the Internal do so likewise; both which piercing the Midriff, form, by a great number of small twigs, upon the upper Orifice of the Stomach, a Plexus; and then the Internal branch spreads it self-down to the bottom of the Stomach; and the External branch spreads it

felf upon the inside, about the upper Orifice of the Stomach. This great number of Nerves, which is about the upper Orifice, renders it very sensible, and from them also proceeds the great Sympathy betwixt the Stomach, Head, and Heart; upon which account Van Helmont thought, that the Soul had its feat in the upper Orifice of the Stomach.

The Plexus Nervosus of the Hypochondria and Mesenterium give several branches to the bottom of the Stomach, therefore in Hysterick and Hypochondriack Passions the Stomach is

also affected.

The Use of the Stomach is Digestion. which is the Diffolution or Separation of the Aliments into fuch minute Parts as are fit to enter our Lacteal Vessels, and circulate with the mass of Blood: or it is the simple breaking of the Cohasion: of all the little Molecula which compose the Substances we feed upon. Now the principal Agents employed in this Action. are, first, the Saliva, the Succus of the Glands in the Sromach, and the Liquors we drink, whose chief property is to fosten the Aliments, as they are Fluids, which eafily enter the Pores of most Bodies, and fwelling them, break their moft intimate Cohæfions. When the Aliments are thus prepared, their Parts are foon separated.

ts Víe.

separated from one another, and dissolved into a Fluid with the Liquors in the Stomach, by the continual Motion of its Sides, whose Power in this Action, is, by that great Improver of the true Theory of Physick, the learned Pitcairne, demonstrated to be equal to the pressure of 12951 Pound weight: To which if we add the force of the Diaphragma and Muscles of the Abdomen, which likewise conduce to Digestion, the Summ will amount to 261086 Pound weight. These two Actions we fee more clearly in Birds, because they are performed in two Stomachs. In the first, the Corn is only fwell'd and foften'd by the Liquor of its Glands, but broken and dissolved in the fecond, which is compos'd of very strong Muscles, because those of the Abdomen and Diaphragma are weak, neither do they act upon the Stomach, as in Men.

SECT. VII.

Of the Intestines and Mesentery.

When the Aliments are sufficiently what the Gut, dissolved in the Stomach, they are, are, by its Muscular Fibres, thrust out into the Intestines, or Guts. Now the Intestines are a long and large Pipe, which, by several circumvolutions and turnings, reaches from the Pylorus to the Anus.

Their Coats

They are knit all along the edge of a Membrane call'd the Mesentery, and are fix times as long as the Body to which they appertain; that the Chyle which escapes the Lasteals of one part of the Guts, may be taken up by those in the next. They are compos'd of Three Coats, of which the First and inmost is made up of short Fibres bound together by fine Blood-Veffels, and disposed as those of the Stomach; for the length of a Fibre is the thickness of the Coat. Leeuwenhoeck first observed these Fibres with his Glasses: but if you carefully in seet the Mesen-terick Artery with warm Water, they will feparate from one another, and become visible to the naked Eye. They act after the same manner as those of the inner Membrane of the Stomach, for the contracting of the Cavity of the Guts. This Coat being much larger than the others, lies in Wrinkles or Plaits, called Valvula Conniventes, which in the Small Guts run in larger Segments of Circles, and are closer to one another, than in the Great Guts. It has likewife a great number of little Glands, which in the Small Guts lie in clusters every where but where they are knit to the Mesentery: In the Great Guts they are much fewer, and are placed at some distance from one another. The Use of their Glands is disputed: Some think that they separate the Slime which belmears

befinears the infide of the Intestines, to defend them against the acrimony of the Bile; but this, more probably, comes from some remainder of the Chyle. Others take them for the Mouth of the Lacteal Vessels: but there are many Lacteals where there are no Glands. If we consider, that they are most chiefly placed where the Lacteals are most numerous, we cannot but think that they separate a Liquor for diluting of the thick Chyle, that it may the more easily enter the narrow Orisices of the Lacteal Veins.

The Second Coat is made up of Two Orders of Muscular Fibres; of which one runs straight, according to the length of the Guts; the other goes round, and its Fibres are more reasonably thought to describe a Spiral Line than Circles. By the successive Motion of the Parts of these two Orders of Fibres the Guts are in a continual Undulation, which is call'd their Vermicular, or Peristaltick Motion.

The Third and External Coat is com-

Though the Intestines be one continued The Division Pipe, yet Anatomists divide it into fix of the Guts Parts, three thin and small, and three thick and great. The three thin and small, are the Duodenum, Jejunum, and Reum.

The Duodenum is the first part of the Of the Du

Intestines ; denum.

Of the Intestines and Mesentery.

Intestines; it's about twelve fingers breadth long: it is continued to the Pylorus, from which turning downwards, it runs under the Stomach immediately. above the Vertebra, towards the left side, and ends at the first of the windings under the Colon. At its lower end there are two Canals which open in its Cavity, one comes from the Liver and Gall-bladder, call'd Ductus Communis Cholidochus; the other from the Pancreas, call'd Ductus Pancreations. The first brings the Bile; the second the Succus Pancreations into this Intestine. It differs from the other two in this, that its Passage is straighter, and its Coats thicker.

f the Jeju-

40

The Second is the Jejunum; it begins at the first winding of the Guts under the Colon, where the Duodenum ended; and making feveral turnings and windings, from the right fide to the left, and from the left again to the right, it is continued to the Ileum, filling all the upper part of the Umbilical Region, being about 12 or 13 hands breadth long. It differs from the Ileum only in this, that it hath some more Vena Lattea, into which the Chyle passing, it is found always more empty, therefore it is call'd Jejunum: And the folds of its inner Coat are nearer to one another, and in greater number than in the Ileum.

The Third and last of the Small Guts of the lleumist the Ileum, it is about 21 Hands breadth long; it begins where the Jejunum ends, and making several turnings and windings, it fills all the lower part of the Umbilical Region, and all the space betwixt the Ilia, and is continued to the beginning of the Colon at Right Angles; its Passage is a little narrower than that of the Jejunum, and its Coats seem somewhat thinner.

This Intestine, because of its situation, falls easily down into the Scrotum, by the Productions of the Peritonaum. In it also happens the Volvulus, when one part of this Gut enters the Cavity of

another.

The Thick and Great Guts are the

Cacum, Colon, and Rectum.

The Cacum, although small, yet is taken of the Cacon the first of the Great Guts; but the cum. Ancients, who made this Division of the Guts, call'd the beginning of the Colon the Cacum; and what is now call'd Cacum, they call'd Appendix Caci. It is four or five fingers breadth long, and about the bigness of a Swan's Quill. It is call'd Cacum, because it is open only at one end, by which it is tied to the beginning of the Colon, to which it seems to be an Appendage; so that the Excrements go in and come out at the same Orifice. Its other end, which is shut,

is not tied to the Mesentery, but to the Right Kidney, by means of the Peritonaum. Its Use is yet unknown. Some take it for a second Stomach, others for a Recepticle of the Excrements of the Fatus, in which it's always full, till after the Birth. Others say, it contains a ferment, and others the flatuosity of the Intestines; and others, that it separates a Liquor by some Glands which are in its Cavity; which Liquor serves to harden the Excrements as they pass through the Colon.

Of the Colon.

The Colon is the greatest and widest of all the Intestines, and about eight or nine hands breadth long. It begins where the Ileum ends, in the Cavity of the Os Ilium on the right fide, from whence ascending by the Kidney of the same side, it passes under the Concave fide of the Liver, to which it is fometimes tied, as likewife to the Gall-Bladder, which tinges it yellow in that place; then it runs under the bottom of the Stomach to the Spleen in the left fide, to which it's also knit; from thence it turns down to the left Kidney, and then passing in form of an S, it ends at the upper part of the Os Sacrum into the Rectum.

At the beginning of this Gut there is a Valve formed by the Production the inmost Coat of the Intestines in this place; it hinders the Excrements which

are once fallen into the Colon to return again into the Ileum. It has a strong Ligament, which running along its upper fide from the Heum to the Rectum. strengthens it against the weight of the Excrements, and draws it together into Cells, which, with the Valvula Conniventes, retard the Passage of the Excrements, that we may not be obliged continually to go to Stool. The fleshy Fibres of its second Coat are greater and ftronger than those of the other Intestines, because a greater strength was requisite to cause the Excrements to ascend. The chief design of the Colon's furrounding the Abdomen, and, with the Rectum, touching all the Parts contain'd in it, feems to be, that by immediate fomentation with Clysters we might eafe them of their Maladies.

The Rectum is the last of the Intestines: of the ReIt is a hand's breadth and a half long that its Cavity is about three singers in diameter; Coats are thicker than those of the Colon. It begins at the upper part of the Os Sacrum, where the Colon ends, and going straight down, it is tied to the extremity of the Coccyx by the Peritanaum behind, and to the Neck of the Bladder in Men, and in Women to the Neck of the Womb before, from thence comes the Sympathy between these Parts. There is very much Fat about its external side, therefore it is call'd the Fat Gut. Its Ex-

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tremity forms the Anus, into which there are three Muscles inserted. The first is Of the Muscles the Sphintter Ani, this is a fleshy Muscle of the Rectum, about four fingers broad, compos'd of Circular Fibres, which embrace the Extremity of the Rectum for three fingers height, and which hangs over it another finger's breadth; so that in the Operation tor a Fistula in Ano, there is always an Inch more of this Muscle cut than there is of the Rectum. It is connected forwards to the Acceleratores Urina in Men, and to the Neck of the Womb in Women, and backwards to the Os Coccygis. Its Use is to shut the Passage of the Anus, which the weight of the Faces open.

The other two Muscles are the Levatores Ani; they arise from the Internal and Lateral fide of the Os Ischium, and are inserted into the Sphinster Ani-They draw the Anns upwards. A Palfy of the Sphineter causes an involuntary running of the Excrements, and a Palfy of the Levatores causes a descent of the

Anus.

Of the Veffels of the Guts.

Now all these Guts lying in a little space, are kept from entangling one another by the Mesentery, which is a Fat Membrane, placed in the middle of the Abdomen, almost of a Circular figure, with a narrow Production, to which the end of the Colon and beginning of the Rectum are tied. It is about four fingers breadth and

and an half in diameter; its circumference being full of Plaits and Foldings. is about three Ells in length. The Intestines, which are tied to this Circumference, are about eight or nine Ells long; so that to every Inch of the Gircumference of the Mesentery there are three Inches of the Intestines fastened. The Mesentery it self is strongly tied to the first three Vertebra of the Loins. It's composed of three Lamina; the inner, upon which the Glands and Fat lie, and the Veins and Arteries run, is its own proper Membrane; and the other two, which cover each fide of the proper Membrane, come from the Peritoneum.

Between the two External Lamina of the Mesentery run the Branches of the Arteria Mesenterica Superior and Inserior, which bring the Blood to the Intestines and the Vena Meseraica, which being Branches of the Porta, carry the Blood back from the Guts to the Liver. Here all the large Branches of both Arteries and Veins communicating with one another, march directly to the Guts, where, with the Nerves from the Plexus Mesentericus, they divide into an infinite number of smaller Branches, which spread themselves exceeding finely upon the Coats of the Intestines.

The Vena Lastea and Lymphatick Veffels run likewise upon the Mesentery, in which there are also several Vesicular Glands, the biggest of which, in the middle of the Mesentery, is call'd Pancreas Assellis. These Glands receive the Lympha and Chyle from the Lasteal Veins, of which next in order.

SECT. VIII. bilograce

Of the Latteal Veins, Receptacle of the Chyle, and Thoracick-Dutt.

W Hilst the grosser Parts of the Aliments are by the Peristaltick Motion of the Guts, by the pressure of the Midriss, and Muscles of the Lower Belly, thrust out at the Anns; the finer Parts, or Chyle, are by the same powers squeez'd into the narrow Orifices of the Lacteal Veins.

These are long and slender Pipes, whose Coats are so thin as to become invisible when they are not distended with Chyle or Lympha. They arise from all the Parts of the Small Guts by fine Capillary Tubes, which as they run from the sides of the Guts to the Glands in the Mesentery, unite and form larger Branches; these are called Vena Lastea Primi Generis. The Mouths of these Lasteals, which are

open

open into the Cavity of the Guts, from whence they receive their Chyle, are fo small, as not to be seen by the best Microscope. It was necessary they should be smaller than the finest Arteries in the Body, that nothing might enter which might stop the Circulation of the Blood. The same Extremity of the Lacteals has likewise communication with the Capillary Arteries of the Guts, by which they receive a Lympha which dilutes and propels the Chyle forwards, and washes the Lacteals and Glands, that they may not furr, and be obstructed by the Chyle's staying in them upon fasting. The other Extremity of the Lacteals discharges the Chyle into the Veficular Cells of the Glands dispersed up and down the Mesentery : And from these arise other Lacteals of a larger fize, which carry the Chyle immediately into the Recept aculum Chyli; they are call'd Latter Secundi Generis. The Lacteal Veins have Valves at feveral distances, which hinder the Chyle from returning back into the Intestines.

Assellius, who first discover'd the Lacteal Vessels, in the Year 1622, and his Followers, thought that they carry'd the Chyle to the Liver; till Pequet, in the Year 1651, found out the Recepta-of the Reculum Chyli, and Ductus Thoracicus; ceptaculum though they were both elegantly describ'd Chyli.

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Itaque in illis Bartholomaus Eustachius, many Years (scil. Equis) before the Discovery of the Lacteal ab hoc ipso Veins.

insigni trunco Veins.

finifiro Juguli, qua posterior sedes radicis Vena interna Jugularis spectat, magna quadam propago germinat, qua praterquam quod in ejus origine Ostiolum semicirculare habet, est etiam alba & aquei humoris plena; nec longe ab ortu in duas partes scinditur, paulo post rursus coeuntes in unam, qua nullos ramos dissundens, juxta sinistrum Vertebrarum latus, penetrato septo transvers, deorsum ad medium usque lumborum sertur; quò leco latior essetta, magnamque Arteriam circumplexa, obscurissimum sinem, minique non bene perceptum obtinet. Barth. Eust. Antigrammate xiii. de Vena sine Pari.

The Receptacle of the Chyle is eafily found in live Bodies, but with a greater difficulty in those that are dead. It lies about the descending Trunk of the Great Artery, between the Celiack and Emulgent Arteries, furrounded by feveral Lympharick Glands, call'd Glandula Lumbares, which discharge their Lympha into it. The Receptacle feems to be only a large Bag form'd by the union of the fecond order of Lacteals, and many Lympheducts which open into it. It contains about an Ounce of Water. It is sometimes in Brutes, as well as in Men. divided into two or three Parts, which unite into one Duct about the bigness of a Goose-Quill. This Duct ascends into the Thorax behind the Great Artery; and about the Heart it frequently divides into two or three Branches, which immediately unite again into one, and creeping along

along the Gullet, it marches to the left Subclavian Vein, where it opens at one or two Orifices, which are cover'd with a semi-lunar Valve, that the Blood may pais over them, and the Chyle run from underneath it and mix with the Blood in the Veins. The Ductus Thoracicus has Valves at feveral distances, which hinder the Chyle that has once past them, from talling back. It goes always up the left Side, that the Pulsation of the Artery, which lies immediately upon it, may press the Chyle upwards. The Thoracick Duct receives the Lympheducts from the feveral Parts in the Cheft, as it passes along to the Subclavian Vein. through it, dearing a roll so to others.

SECT. IX.

Of the Lymphatick Vessels.

Having frequent occasion to mention the Lymphatick Vessels which have no particular Source or Origination, but which almost all send their Lympha to the Receptacle of the Chyle and Thoracick Duct, just now described; I shall therefore give a general Description of them in this Place.

The Lympheducts are slender pellucid Tubes, whose Cavities are contracted at small and unequal distances, by two opposite semi-lunar Valves, which permit

a thin

a thin and transparent Liquor to pass through them towards the Heart, but which thut, like Flood-gates, upon its returning. They arise in all Parts of the Body: But after what manner, I think, needs no great Dispute; for without doubt, all the Liquors in the Body (excepting the Chyle) are feparated from the Blood in the fine Capillary Vessels by a different Pipe from the common Chanel in which the rest of the Blood moves: But whether this Pipe be longer or no longer than the thickness of the Coat of the Blood-Vessel, whether it be visible or invisible, it is still a Gland whilst it fuffers some parts of the Blood to pass through it, denying a naffage to others. Now the Glands which separate the Lympha are of the smallest kind, being invisible to the finest Microscopes; but their Excretory Ducts, the Lymphatick Veffels, unite with one another, and grow larger as they approach the Heart; yet they do not open into one Common Chanel, as the Veins do, for fometimes we find two or three or more Lympheducts running by one another, which only communicate by short intermediate Ducts, or which unite and immediately divide again. In their progress they always touch at one or two Conglobate or Veficular Glands, into which they difcharge themselves of their Lympha. SomeSometimes the whole Lympheduct opens at several places into the Gland, and fometimes it fends in only two or three Branches, whilst the main Trunk passes over and joins the Lympheducts which arise from the opposite side of the Glands, exporting again the Lympha to their common Receptacles. Now the Glands of the Abdomen which receive the Lympheducts from all the Parts which it contains, as likewise from the Lower Extremitles, are the Glandula Inquinales, Sacra, Iliaca, Lumbares, Mesenterica and Hepatica; all which fend out new Lympheducts, which pour their Lympha into the Recept aculum Chyli, as those of the Chest, Head, and Arms do into the Ductus Thoracicus, Jugular and Subclavian Veins. The chief reason for the Lymphaticks emptying themselves into the Conglobate Glands, feems to be, that the flow moving Lympha may receive a new Velocity from the Elastick compression of the fibrous Cells of the Glands, whose fabrick refembles that of the Spleen; and therefore they are improperly call'd Glands. being they separate no Liquor from the Blood. It's true, their Exporting Lympheducts communicating with their Arteries, must receive a Lympha from them; but this is done without the help of the Conglobate Glands, as at the first rife D 2

rise of the Lympheducts from all the

Parts of the Body.

If you examine the Lympha Chymically, you will find that it contains a great deal of Volatile, but no Fix'd Salt, some Phlegm, some Sulphure, and a little Earth.

When we confider the Places into which the Lymphaticks discharge themfelves, we cannot but think that one of the principal Uses of the Lympha is to dilute the thick Chyle, that it may the more easily mix with the mass of Blood. But if this were the only Intention of Nature, in the Separation of the Lympha, it would be hard to give any good Reason why it should be separated at such distances from the Parts into which it is emptied, and almost every where, where there are Capillary Blood-Vessels. And therefore I am apt to think, that there was a Necessity that the Lympha should not be mix'd with the refluent Blood in the Veins; because the cohasion of the different particles of the Blood being broke in the Lungs, and by their continual collision against the sides of the Arteries, when the Blood comes to move flowly from a narrow chanel into a wider. each Particle easily moving in the thin and fluid Lympha, would unite with more of its own kind, and form feveral Molecula Moleculæ each of one fort of Particles; which unequal mixture of the Blood would be the ruine of the whole Machine.

S E C T. X.
Of the Glands in General.

THE Modern Anatomists have reduced all the Glands of the Body to two sorts, viz. the Glandule Conglobate,

and the Glandula Conglomerata.

A Conglobate Gland is a little, smooth body, wrapt up in a fine Skin, by which The Conglobit is separated from all other Parts, only Gland. admitting an Artery and Nerve to pass in, and giving way to a Vein and Excretory Canal to come out. Of this fort are the Glands of the Brain, the Labial Glands,

and the Teftes.

A Conglomerate Gland is compos'd of The Conglom many little Conglobate Glands, all tied rate Glands together, and wrapt up in one common Tunicle or Membrane. Sometimes all their Excretory Ducts unite and make one common Pipe, through which the Liquor of all of them runs, as the Pancreas and the Parotides do. Sometimes the Ducts uniting, form several Pipes, which only communicate with one another by cross-Canals, and such are the Mamma. Others, again, have several Pipes, without any communication with

one another, of which fort are the Glandula Lachrymalis, and Prostate. And a fourth fort is, when each little Gland has its own Excretory Duct, through which it transmits its Liquor to a common

Bason, as the Kidneys.

Thus much of the Fabrick of the Glands we know from Diffections : Their Inward Structure, and the Manner by which they separate the several Humours from the Blood, good Glasses and found Reasoning must discover. Ancients thought that the Glands were Cisterns which contained certain Liquors, by which the Blood being fermented, throw off the Humours we find in the Excretory Ducts. But as these Ferments must mix with the Blood, to they must be exhausted and carried off by the Blood into Veins. And because all the Liquers in the Body are separated from the Blood, there must therefore be another Ferment to separate more: but this second Ferment is liable to the same fate as the first; and therefore there must be an infinite Series of Ferments in the Body, which is absurd. If it should be said, that the Ferments are not carry'd off with the Blood, they must be stopt by the Stru-Eture of the Glands: but then we have a Secretion without a Ferment, which is the Opinion of most of the Moderns. Some of which think that the Glands are Tubes

Tubes, whose Orifices differing in figure, admit only bodies of fimilar figures to pass through them. But this Opinion is demonstrably falle; for besides that Liquors are susceptible of all figures, and that bodies of any figure and a leffer diameter than that of the Gland will pass through, and that even a body of a fimilar figure and equal diameter with that of the Orifice of the Gland, may be prelented innumerable ways, and not be able to pass through, whilft there is only one way it can pals; I lay, belides all thefe, it is easie to demonstrate, that all the Velfels in the Body are either Conical or Cylindrical, and confequently no difference in the figure of their Orifices: for the pressure of a Fluid being always perpendicular upon the fides of the Veffel that contains it, and equal at equal distances from the fides; the fides must be every where equally distracted; that is to fay, a Section perpendicular to the Axis of the Veffel must be a Circle, and confequently the Vessel be either Cylindrical or Conical. This is agreeable to the Observations and Speculations of the nicest Anatomists, who tell us, that a Nuck Gland is nothing but a Convolution of Bellini. fmall Arteries, whose last Branches are Cylindrical, or, which is the fame thing, part of an infinitely long Cone. Now there being no Ferment lodg'd in any part

part of the Body, and the Structure of all Glands being the fame, Secretion must be perform'd by the Velocity of the Blood, and the Magnitude of the Excretory Orifice; for we can conceive nothing else that can conduce to it. The different Velocities of the Blood at the feveral Glands, produce different cohæsions in the Particles of the Blood, and the magnitude of the Orifices are agreeable to the feveral Cohæsions; for through a large Orifice Particles of the greatest cohesion may pass, but a small will only admit of a Fluid whose Particles may be easily separated from one another. The narrow limits of my Defign will not allow me to illustrate this Opinion any further: Another may be feen in Dr. Cockburn's Occonomia Animalis, who is amongst the first who proposed to explain Secretion, from the different Velocities of the Blood.

SECT. XI.

Of the Pancreas, and Succus Pancreaticus.

the Pan. THE Pancreas, or Sweet-bread, is a Gland of the Conglomerate fort, fituated betwixt the bottom of the Stomach and the Vertebra of the Loins; it lies a-cross the Abdomen, reaching from the Liver to the Spleen, and is strongly tied

receives its common Membranes. It weighs commonly four or five Ounces. It is about fix fingers breadth long, two broad, and one thick. Its Substance is a little foft and supple; every little Gland has a small excretory Vessel, which uniting all together, form one common Duct about the bigness of a Quill, clear and transparent, like to a Lymphatick Vessel. This Duct runs all along the middle of of the Duch the Pancreas, and opens into the Cavity Pancreaticus of the Duodenum, at its lower end, where there is a little Caruncle at its Orifice. Sometimes it joins the Ductus Communis Cholidochus, and then both open at one Orifice into the Duodenum. This Canal was first found by Virtsungus, and is call'd' Ductus Pancreaticus Virtlungi.

The Pancreas receives Arteries from of the Veffel the Coliack. Its Veins carry their Blood of the Paninto the Splenick Branch of the Porta, creas, and the Intercostal furnishes it with Nerves. The Use of the Succus Pancreaticus is to dilute the Chyle with the Liquor that is separated in the Glands of the Guts, that it may the more easily enter the mouths of the Lacteal Vessels.

It is fallened in the Rody by two Light

the Substance of the Liver, It is the

Carpan

T.D. 3. E. Diagon the Performant that

SECT. XII.

Of the Liver and Gall Bladder.

THE Liver lies in the right Hypochondrium. Its Convex and upper fide reaches a little beyond the Cartilago Xiphoeides, and touches the Diaphragma: Its Concave and under fide covers the Pylorus, and part of the Stomach, as also a part of the Colon, all the Duodenum, a part of the Jejunum, and of the Omentum. When we stand, its Extremity goes near

to the Navel.

to Figure.

The Liver is almost round, and pretty thick. Its upper side is Convex, smooth, and equal; the other side is Concave, but not so equal. In its middle and sorepart it is divided into two, by a Fissure, where the Umbilical Vessels enter. The Gall-bladder is fastened to its under side, where there are three Eminences that the Ancients called Porta, of which one passes for a little Lobe. When it is full of Blood, it is of a dark red colour; when the Blood is washed out of it, 'tis pale and soft.

It is fastened in the Body by two Ligaments. The first, which is large and strong, comes from the Perisonaum that covers the Diaphragma, and penetrating the Substance of the Liver, it joins the

Capsula

Capfula of the Porta. The second is the Umbilical Vein; it comes from the Navel, and enters by the great Fissure of the Liver to join the Porta: After the Birth, it degenerates into a Ligament, but is of little use for the fastening the Liver.

Tis cover'd with a common Mem-Its Membrane from the Peritoneum, besides that branes. every Lobe and Gland has its proper

Membrane.

The common Membrane of the Liver to Substant being raised, its Substance appears, which is composed of several Lebes of Glands, of a Conick figure, not easily to be distinguished in the Liver of Men. These Lobes are disposed all along the sides of each branch of the Vessels in the Liver; they are every one cover d with a proper Membrane, and tied to one another by other Membranes, in such a manner, as that they leave also little Intervals betwist them, which are more visible in Fish, and other imperfect Animals. Every Lobe receives small Vessels, which are continued to the little Glands of which each Lobe is composed.

The Vessels of the Liver, are, the Vena its Vessels. Cava and the Porta. They are accompanied with many small branches of the Arteries, which come from the Caliack and Mesenterica Superior, which two bring the Blood for the nourishment of

the

the Liver. The Porta brings the Blood full of Bile for Secretion, and the Cava carries back the Blood that remains from both.

The Vena Porta and the Cava enter the Liver by its Concave fide, and are equally distributed through all its Substance: where-ever there is a Branch of the one, there is a Branch of the other; so that each Lobe, and each Gland in the Lobe, whether on the Convex or Concave fide, receive the same Vessels. The Vena Porta discharges, by the Extremity of its Branches, the Blood, as yet full of Bile, into the little Glands which form the Lobes, of which the Parenchyma of the Liver is composed, where being separated from the Bile, which is taken up by the Bilary Veffels, (which accompany the Branches of the Porta, and carried to the Gall-Bladder or Duodenum) it is carried back by the Branches of the Cava.

It receives its Nerves from the Plexus

Hepaticus of the Intercostal Nerve.

Besides these Vessels, the Liver has Lymphatick Vessels, most of which open into the Conglobated Glands, near the Porta, on the Concave fide of the Liver : from thence the Lympha is carried by other Lymphaticks to the Recept aculum Chyli.

els of the er.

Excretory We come now to the Excretory Vessels of the Liver, which are, the Vesicula Fellis,

and

and Porus Bilarius. The Vesicula Fellis of the Gallor Gall-Bladder, is fixed to the Concave Bladder. fide of the Liver. Its Figure is like that of a Pear; 'tis of a different bignessalmost in every Subject; the biggest is about the bigness of a little Hen-egg: When the Liver is in its natural fituation, the bottom or largest part of the Bladder is downwards, and the Neck or narrowest part upwards; and then it touches the Stomach as well as the Colon, where it frequently dyes them yellow. This Bladder is composed of three Coats, the outermost is common to it with the Liver; the next. which is proper to it, is thick and folid, compos'd of transverse, oblique and nervous. This last Coat is cover'd within by a kind of Crust or Mucous, which preferves it against the Acrimony of the Bile. Malpighius has remark'd some little Glands between its Coats, where the Cyflick Arteries end, which gave him ground to think that it was the same in the Porus Bilarius. The Bile is brought into the Gall-Bladder by some small Vesfels which arise from the neighbouring Glands, and uniting, form one or two Pipes which open at the Neck of the These Ducts I could never Bladder. discover in any Liver but an Oxe's, though I have reason to think that they are likewise in a Humane.

From the Neck of the Gali-Bladder there goes a Pipe, not in a straight Line with the Bladder, but, as it were, more the Ductus depress'd in the Liver. It is call'd Ductus ysticus. Cyfticus. Some small Bilary Ductsopen likewise into it, and its inner Membrane has several Ruga, which retard the motion of the Bile. To this Pipe, which is about the bigness of a Goofe-Quill, is uctus Hepa- join'd another, call'd Ductus Hepaticus, or Porus Bilarius. Thele two together make the Ductus Communis Cholidochus which goes obliquely to the lower end of the Duodenum, or beginning of the Tejunum. After it has pierced the first Coat,

having once entred the Intestine.

The Gall-Bladder has two Veins from the Porta, which are call'd Cystica Gemella. It has some small Arteries from the Caliaca Dextra, and some Lym-

it runs near two fingers breadth between the Coats, before it opens in the Cavity of the Intestine; which oblique Insertion serves instead of a Valve to hinder the Bile to return into the Ductus Communic.

phaticks.

the Porus

The Porus Bilarius is another Excretory Vessel of the Liver. It has as many Branches as the Vena Porta, which it accompanies through every Lobe and Gland in the Liver. Where-ever there is a Branch of the one, there is a Branch of the other; and these two are enclosed in one

one common Capsule, as in a Sheath: The Use of this Capsule is to facilitate the Motion of the Blood and Bile, by the contraction of its Fibres. All these Branches unite, and make one Trunk of the bigness of a small Quill, which joins (as we have said) at the end of the Dustins Cysticus, for the carrying the Bile from the Liver to the Intestines, by the Dustins Communis Cholidochus.

The Infertion of the Porus Bilarius into the Ductus Cyfricus, is oblique, with its Mouth looking towards the Ductus Communis; by which means it is impossible that the Bile which comes from the Cyfus

can enter the Porus.

The Bile which is found in the Gall-Bladder, is thinner, and different from that which is in the Porus Bilarius. This Malpighius proves by an Experiment, which is, that having tied the Ductus Cyficus, he remarked, that the Bile which came by the Porus Bilarius, was of a different tafte, smell, colour, and consistency, from that in the Gall-Bladder.

The Use of the Bile is to sheath or The We of blunt the Acids of the Chyle; because Bile. they being entangled with its Sulphurs, thicken it so as that it cannot be sufficiently diluted by the Succus Pancreations to enter the Lacteal Vessels. This appears not only from the Analysis of the Bile,

which

which yields more of a Lixivious than of a Volatile Alcaline Salt: but likewise from what Leeuwenhoeck has observed, that of the great quantity of acid Salts he has feen amongst the Aliments in the Stomach, he never could find any in the Chyle after it had passed the Duodenum.

Because some Chyle is almost always passing through the Duodenum, therefore it was necessary that the Bile likewise should be continually poured into it from the Dudus Hepaticus. In a Dog, whose Ductus Communis Cholidochus was near as big as a Man's. I have gather'd it at the rate of two drachms in one hour. But because a greater quantity of Aliments requires a greater quantity of Bile; therefore, according as the Stomach is more or less distended with Food, it presses out of the Gall-Bladder a proportionable quantity of Gall to be mix'd with the Chyle in the Guts. Cofficient he recognised.

SECT. XIII.

came by the Power Billyrus.

Of the Spleen.

, Connexion Spleen.

THE Spleen is fituated in the left Spleen. phragma, between the Ribs and the Stomach, above the left Kidney: It is tied to the Peritonaum, to the Midriff, and to the Omentum. It is of a bluish or leaden colour, utitela

colour, of an oblong figure, thick at the edges, not thin, as the Liver. It has two Membranes. The External comes from the Peritonaum.

The Internal Membrane is finer and of the Interthinner than the External: for if you nal Memblow into the Splenick Artery, the Air
fhall pass through the one, but not the
other. Its Fibres are not irregularly
woven, as those of other Membranes
seem to be; but they come from innumerable Points, as Rays from so many
Centres; and the Fibres of one Point are
regularly woven with the Fibres of the
Points surrounding it. It receives Veins,
Nerves and Arteries from those that enter
the Spleen.

The Substance of the Spleen is not only of the Subkept together by its two Membranes, but stance of the also by innumerable Fibres which come Spleen, from the Points of the Internal Membrane, and are inserted in the Points of the opposite side of the same Membrane.

Fibres feem to compose the Internal Membrane.

The Spleen is composed of an Infinity of Membranes, which form little Cells and Cavities of different figures and bigness, which communicate with one another, and which are always full of Blood.

the Expansion of the Extremity of these

At the Extremities of the Blood-Vessels in the Spleens of Sheep, we find feveral small white and fost Specks, which Mal-

pighius calls Glands.

Arteries

The Spleen has Arteries from the Carliack, whose Capillary Branches make frequent Inosculations upon the Membranes of the Cells. Its Veins, whose Extremities communicate with the Cavities of the Cells, as they come out of the Spleen, unite and make the Ramus Splenicus of the Porta, which carries the Blood from the Spleen to the Liver. Thefe, with its Nerves, which are considerable from the Plexus Splenicus, are equally distributed through the whole Substance of the Spleen, being all included in a common Capsula. There are likewise a few Lymphatick Vessels which arise from the Spleen, and discharge themselves into the Lumbary Glands, Wall of the got seed

Sam:

ve of the The true Use of the Spleen is yet unknown. The Ancients thought that it was the receptacle of the Melancholick Humour, fome confidering that in the Spleen there are a great number of Membranes and Fibres, and also many Nerves, think that the Blood is attenuated, and becomes more spirituous in the Spleen; and confidering that the most of the Blood in the Liver comes immediately from the Spleen and Omentum, they think that the one furnishes the Oleaginous, the other the Spirituous part of the Bile.

SECT. XIV.

Chibren illness:

Of the Kidneys, Glandulæ Renales, Ureters and Bladder.

THE Kidneys are Two in Number, of the Navaone on each fide; they have the ber and Figure
fame Figure as Kidney-beans: Their
length is four or five fingers breadth;
their breadth is three, and their thickness
two: The right is under the Liver, and
the left under the Spleen. In a Fætus
their External Substance is divided into
several Lobes join'd together, which in
Adults becomes more close; therefore
their Superficies is equal and smooth:
They have two Membranes, the one common from the Peritonaum, the other
proper; they are ordinarily cover'd with
much Fat; their Colour is a dark Red.

We observe in the Kidneys, Lympha- of their Vestick Vessels, which discharge themselves sels. into Pequet's Reservatory, Nerves which come from the Intercostals, Veins which go to the Cava; their Arteries come from the Aorta.

These Veins and Arteries are call'd Emulgents; they pierce the Reins in their Concave sides, (which lie nearest the Cava and Aorta) included in one Capsule, and are divided into several Branches, which surround the Pelvis. These Branches are again divided into an infinity

infinity of other less, which go to the external part of the Reins, where they inosculate, and form a sort of Net, from which their Extremities coming, terminate in an infinity of little Glands.

Their Sub.

These Glands are of a round figure; they compose the outer Substance of the Reins, which is half a finger thick. From each of them there goes a long a small Tube, these Tubes compose the inner Substance of the Reins. As they approach the Pelvis or Bason, they gather together in little bundles, whose Extremities piercing the Membrane of the Pelvis, form those little Protuberances on the infide of the Pelvis, call'd Papilla. the Pelvis. Pelvis or Bason is a Cavity in the middle of the Kidneys, formed by a Dilatation of the Ureters. It sends out several Ramifications, which divide the Urinary

be Ve of the Cidneys.

fort of Capfula to the Blood-Vessels. The Use of the Reins is to separate the Urine from the Blood, which, by the motion of the Heart and Arteries is thrust into the Emulgent Branches, which carry it to the little Glands; in which the Serofity, being separated, is received by the Orifice of the little Tubes which go from the Glands to the Pelvis; from thence it runs by the Ureters into the Bladder. The Blood which was carry'd into the Glands, and which could not

Tubes into Bundles, and which make a

enter

enter their Excretory Tubes, is brought

back by the Emulgent Veins.

In the middle between the Aorta and of the Glanthe Kidneys, a little above the Emulgent dulæ Renales. Vessels, are situated the Glandula Renales or Capsula Atrabilares. They are two in number, one on each fide, wrapt up in fome Fat: They fometimes change their fituation, and their figure is also various; for in fome they are round, in others square, triangular, or of an irregular figure; the right is ordinarily bigger than the left, and each about the bignels of a Nux Vomica: In a Fætus they are always almost as big as the Kidneys. They are cover'd with a fine Membrane, and within they have several small Sinus's which contain a blackish fort of Liquor. Their Blood-Vessels are Branches sometimes of the Vena Cava and Aorta, and iometimes of the Emulgent.

The Intercostal Nerve furnishes a Their Vesselbranch, which makes a Plexus upon and Vse. them. Their Use is not yet known.

Some think they separate a Liquor from the Arterial Blood, for the liquefying the Blood which is too thick after it comes

from the Kidneys.

The Ureters are two long and small of the Vre-Canals which come from the Basons of terms. the Kidneys, one on each side: They lie betwixt the doubling of the Peritonaum; and descending in the form of an S, they

pierce

Their Coats.

pierce the Bladder near its Neck, where they run first some space betwixt its Coats, and then they open in its Ca-

vity.

They are composed of three Coats: The first is from the Peritoneum: The fecond is made of small oblique muscular Fibres: And the third, which is very fensible, has several small Glands which separate a slimy Liquor, to defend it against the acrimony of the Urine. The neighbouring Parts furnish them with Blood-Vessels, and their Nerves come from the Intercostals, and from the Vertebra of the Loins. Their Cavity is sometimes contracted in three or tour places, especially towards the Bladder. Such as are subject to the Gravel, and given to excessive Drinking, have them fometimes fo much dilated, that you may put the end of your Little-Finger into them. Their Use is to carry the Urine from the Reins to the Bladder. Their Obstruction causes a suppression of the Urine.

Of the Blad-

The Bladder is fituated between the Duplicature of the Peritonaum, in the lower part of the Abdomen, between the Os Sacrum and the Os Pubis, above the straight Gut in Men, and the Neck of the Womb in Women. It's tied to the Navel by the Urachus degenerated into a Ligament, and its sides to the Umbilical Arteries:

Arteries; its Neck to the Intestinum Rectum in Men, and to the Neck of the Matrix in Women. It is not of the shape of a Pear, as is commonly said; for it is rather bigger near its Neck, than at the bottom. It is composed of three Coars: The first is a Covering of the Peritonaum. The fecond is compos'd of muscular Fibres, which run irregularly feveral ways. And the third, which is full of Wrinkles for facilitating its Dilatation, is both Glandulous and Nervous. Its Glands separate a viscous and slimy Matter, which defends it from the acrimony of the Salts in the Urine. Around its Neck (which is longer in Men than in Women) there goes a small Muscle call'd Sphinster Vefice. It contracts the Orifice of the Bladder, that the Urine may not run out, but when it thrusts open the passage, by the contraction of the fecond Coat of the Bladder, which is therefore call'd Detrusor Urina. The Blood-Veffels of the Bladder are branches of the Hypogastricks: Its Nerves come from the Intercostals. Its Use is, to be a Reservatory of the Urine, that it may not inceffantly run from us, as it is feparated in the Kidneys.

We find in the Urine much Phlegm and Volatile Salt, a little Sulphur, Earth,

and fixt Salt.

SECT. XV.

Of the Parts of Generation proper to Men.

TH Parts of Generation proper to Men, may be fitly divided into those which prepare and separate the Seed from the Blood, and those which convey it into the Womb. The first is done by three forts of Glands, which are the Testes, the Vesicula Seminales, and the Prostata. The second is the office of the Penis or Yard.

The Testes, which prepare the principal part of the Seed, receive their Blood from two long and slender Arteries which arise from the two fides of the great Artery, a little below the Emulgents; and running between the Duplicature of the Peritonaum, to which they give some finall twigs, they pals out of the Abdomen at the holes in the Transverse and Oblique Muscles, and march over the Os Pubis, within the Productions of the Peritonaum, to the Testicles; but before they arrive, they divide each into two branches, the largest of which are spent upon the Testicles themselves, and the two small ones upon the Epididymides. When the Blood has discharg'd it self of the Seed into the Testicles, it returns by the Veins, which rifing in feveral branches from

from the Testes, tend towards the Abdomen, in the Productions of the Peritoneum, the same way the Arteries came down. In their progress, their branches frequently inosculate, and divide again, till they come near the Abdomen, then they all unite in one Trunk; and therefore, because of their shape, are called Corpora Pyramidalia. In the Abdomen they receive some small twigs from the Peritonaum. The Right Spermatick Vein opens into the Vena Cava, a little below the Emulgent: but the Left is always inserted into the Emulgent of the fame fide, that it may not be obliged to cross the Aorta, whose Pulse would be apt to stop the Blood which returns from the Testicles very slowly, by reason of the narrow Orifices of the Spermatick Arteries, and the largeness of the Veins. These Blood-Vessels have been called the The Vala Pr Vasa Praparantia.

Having described the Blood-Vessels of the Testicles; I come now to their Integuments, which are Three, one Common, and two Proper. The Common is the Scrotum, which is composed of the Scrot of two Membranes, besides the Scarf-skin: tum. The first is the Skin, which is thin, and without Fat in this place, but full of Veins and Arteries. The second is called Dartos; it's a thin Membrane, made up of slessy or muscular Fibres, by means of

which

which the Scrotum is wrinkled and contracted. The Scrotum is divided in the middle by a thin Membrane, which separates the two Testicles. When the Scrotum is little, and contracted, it is a sign of Health; its Use is to contain both the Testicles.

Of the Tunica Vaginalis.

The First of the Proper Integuments is call'd Tunica Vaginalis, or 'Exuberest'is, being formed by the Dilatation of the Productions of the External Membrane of the Peritonaum; its Internal Superficies is smooth, its External rough: it contains the Vasa Praparantia and Deferentia; it embraces loofely the whole body of the Testicle, adhering to one end of the Epididymis. Upon the outfide of this Tunicle runs a Muscle call'd Cremaster, from its office; it rises from the Os Pubis, and spreading its Fibres upon the Elythroides, it suspends the Testicles, and draws them up in the act of Generation.

Of the Albu-

The Second is that which covers immediately the Testicles. It is call'd Albuginea, because of its White colour. It is strong and thick, very smooth and equal. The branches of the Vasa Praparantia are finely wav'd upon it.

of the Subtance of the Tokicles. The Substance of the Testicles, which formerly was thought to be a fort of Marrow, is nothing but the folding of several small and soft Tubes, disposed in

fuch

fuch a manner, that if they could be feparate from one another, without breaking them, they might be drawn out to a great length. They run in short waves from the Tunica Albuginea to the Axis of the Testicles, being divided from one another by thin membranous Productions from the inner fide of the Albuginea. These Productions unite at the Axis of the Testicle; and, form a Cover to some small Tubes which at one end of the Testicle pierce the Tunica Albuginea, and unite into one Canal, which by feveral turnings and windings upon the upper part of the Tefficles forms this body which we call Epididymis. They are of the Epidicover'd with a thin Production of the dymis. Albuginea. The fame Canal continuing and ascending from the Extremities of the Epididymedes, torms the Vasa Defe- of the Vasa rentia, one from each Epididymis, about Deferentia. the bigness of a Goose-Quill: as they ascend within the Tumica Vaginalis, they make feveral short turnings and windings; then they enter by the holes of the transverse and oblique Muscles into the Abdomen, and marching over the Ureters, between the backfide of the Bladder and the Rectum, they grow larger as they approach the Vesicula Seminales, (which open into them) where they come close to one another, and growing again smaller and smaller, they pass through the E 2 Proftata.

Prostate, and open into the Vrothra, 2 little below the Neck of the Bladder. where each Orifice has a spongious border, call'd Caput-Gallinaginis, which hinders the involuntary running of the Seed. The Cavity of the Vasa Deferentia, before they enter the Abdomen, will hardly admit of a Hoe's Briftle; as they encrease, so likewife do their Cavities, which are tortuous, and obliquely contracted by their Inner Coat, which is nervous, whiter and thinner than the External, which is compos'd of Muscular Fibres. The Testicles have several Lympheducts, which discharge themselves into the Inguinal Glands. Their Nerves come from the Intercostal, and 21th of the Spine.

The Spermatick Arteries carry the Blood from the Aorta to the Testicles. which separate that part of it which is fit for Seed. The Veins carry back to the Cava what Blood remains, after the Secretion of the Seed, and the Nourishment of the Parts. The Seed is further purified in the Epididymedes, and in coition is carry'd by the Vasa Deferentia into the Urethra. The reason of the length and Serpentine progress of the Spermatick Vessels, and their Excretory Ducts, is, that the impetus of the Seed at the Caput Gallinaginis might not be sufficient to dilate the Orifices of the Vasa

Vasa Deferentia, but when assisted with the compression of the surrounding Parts.

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The Vesicula Seminales are two in num- of the Vesicu ber, one on each side, situated betwixt le Seminales the Bladder and the straight Gut, tied to the one and the other by a Membrane of fleshy Fibres, which, in time of Coition, contracts and presses the Vesicula: They are cover'd with a pretty thin Membrane, upon which do creep many branches of Veins, Arteries, Nerves, and Lympha-Their External Surface resembles rather that of the Brains than that of the Guts of a little Bird; they are about two fingers breadth long, their broadest part is not an Inch, from which they grow narrower by little and little to their end which is next the Prostata. They have two confiderable Cavities divided into membranous Cells, which open distinctly by two Orifices which are in their small Extremities, into the two Vasa Deferentia, from which they receive the Seed which is separated in the Testicles to be kept till Coition.

The Prostata, or Corpus Glandilosum, of the Prois a Conglomerate Gland situated at the state. Neck of the Bladder, covered with a Membrane made of muscular Fibres, as that of the Vesicula, and for the same Use. It is about the bigness of a Wallnut. The Vasa Deferentia pass through

E 3

its

its Substance, which is Vesicular and Glandulous. The Glands separate a clear and mucilaginous Humour, which lies in the Vesicles till Coition, that it is carried into the beginning of the Urethra by eight or nine Excretory Ducts, which open about the Orifices of the Vasa Deferentia: The border of their Mouth is also spongious, to hinder a continual running of this Humour, which happens in a Gonorrhwa, when their Orifices are corroded by the Morbisck Matter which is thrust, by the Elasticity of the Air, into the empty Ducts, upon Coition.

Of the Yard.

The other principal Member of the Parts of Generation, is the Penis or Yard, whose Shape and Dimensions are pretty well known. Its Skin, which is thin, and without Fat, has a reduplication, which makes a Hood to the Glans or End of the Yard, call'd Praputium or the Fore-ekin. The small Ligament by which it is tied to the under side of the Glans, is call'd Franum. The Use of the Praputium is to keep the Glans soft and moist, that it may have an Exquisite Sense.

The Substance of the Yard is composed of two Spongious Bodies, call'd Corpora Cavernosa; they arise at two different places, from the lower part of the Os Pubis. A little from their root they come close together, being only divided

by

by a Membrane, which at its beginning is pretty thick, but as it approaches the End of the Yard, it grows thinner and thinner, where the Corpora Cavernofa terminate in the Glans.

The External Substance of these Spongy Bodies is hard, thick and white. The Internal is composed commall Fibres and Membranes which form a fort of loose Net-work, upon which the branches of the Blood-Vessels are curiously spread. When the Blood is stopt in the great Veins of the Penis, it runs through several small holes in the sides of their Capillary Branches into the Cavities of the Network, by which means the Corpora Cavernosa become distended, or the Penis erected.

Along the under fide of the Corpora of the Urs Cavernosa there runs a Pipe, which thra, reaches from the Neck of the Bladder to the End of the Yard, call'd the Urethra. The fabrick of this Pipe refembles that of the Corpora Cavernosa, every where but a little at its end, where it joins the Proftata, which is only a thin Membrane: but the middle Substance of all the rest is spongious: The outer is a close and white Membrane, and the Cavity of the Canal is lined by a foft Membrane of an Exquifire Sense. The spongious part of the Urethra at both ends is much larger than in the middle : That end next the Proftate. Ea

Prostata, because of its bigness, is call'd the Bulb of the Urethra; and the other end forms the Glans or Balanus. The Veins in the Urethra have holes in their sides, through which the Blood passes into the Cavities of its Net-work, in an Erection, as in the Corpora Cavernosa.

Erection, as in the Corpora Cavernofa.
On each the Bulb of the Urethra there lies a small Gland, whose Excretory Duct sloping forwards, pours into the Vrethra a viscous and transparent Liquor, which defends it against the acrimony of the Salts of the Urine. And on the opposite side of the Vrethra, upon its Internal Membrane, a little nearer the Glans, there is another small Gland which has the fame office. These Glands were first observed by that diligent Anatomist Mr. Comper. At the other end of the Vrethra, around the Crown of the Glans, where it joins the Praputium, are several other small Glands, call'd, by that accurate Anatomist Dr. Tyfon, Glandula Odorifera: They separate a Liquor which Iubricates the Glans, that the Praputium may flip eafily upon it.

the Veffels

The Yard has a small Ligament, which arises from its back, a little distance from its root, which ties it to the upper part of the Os Pubis, that it may not hang too low. It receives two branches of Veins and Arteries from the Hypogastrick Vessels; besides others from the Pudenda.

The

The two Veins unite near its roots, and from one Trunk which runs along the upper fide of the Yard. It has two Nerves from the Os Sacrum, and several Lymphaticks, which empty them-

selves into the Inguinal Glands.

The Yard has three pair of Muscles. Of its Musc The First is the Erectores; they rise from and Erection the Ischium, a little below the roots of the Corpora Cavernofa, they lie upon them, and are inferted into them. The Second are the Acceleratores, they rife from the root of the Vrethra; they have feveral Fibres which join the Fibres of the Sphinster Ani, they lie upon the Urethra, betwixt the two former, and are inserted into the Corpora Cavernosa. The Third Pair are the Transversales, they arise from the Ischium just by the Erectores, and run obliquely to the upper part of the Bulb of the Vrethra. When these Muscles act, they compress the Veins upon the back of the Penis against the Os Pubis, which is the cause of the Erection as has been faid.

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SECT. XVI.

Of the Parts of Generation proper to Women.

Having in the First Chapter described the Figure and Situation of the External Parts of Generation proper to Women; I shall here only examine their Substance and Use, and then proceed to the Internal Parts.

f the Cli-

The Clitoris, which is in the forepart of the Vulva, is a long and round Body naturally about the bigness of the Viula: it lies within the Skin; nor does any part of it appear outwardly, except its Extremity, which is cover'd with a folding of the Skin made by the union of the Nymphe, call'd its Praputium. The Substance of the Clitoris is compos'd of two spongious bodies, such as those of the Yard; they rife at two different places in the lower part of the Os Pubis, and approaching one another, they unite and form the body of the Clitoris, whose Extremity, which is of an Exquisite Sense, is call'd its Glans. The two spongious bodies, before they unite, are call'd the Crura Clitoridis; they are twice as long as the body of the Clitoris. It has two Muscles, which rise from the Protuberance of the Ischium, and are inserted

Muscles.

in its foongious bodies. They erect the Clitoris in the Coition, after the same manner that the Muscles of the Yard do erect the Yard.

The Clitoris receives Veins and Arte- In Vessel ries from the Hæmorrhoidal Vessels and the Pudenda, Nerves from the Intercostals, which are likewise distributed thorow all the Parts of the Vulva. Remark that the Veins on the one fide of the Vulva communicate with those of the other fide, and so do the Arteries communicate with one another.

The Nympha have been sufficiently of the N described already. Their internal Sub- phase stance is spongious and full of Blood-Wessels, therefore they swell in the Act of Copulation; they receive Vessels and wes as the Clitoris: Their Use to defend the internal parts from exten Injuries, to encrease Pleasure in Contion. to direct the course of the Urine: they are bigger in Married Women than in Maids.

The Hymen is a Circular Folding of the inner Membrane of the Vagina; which being broke at the first Copy lation, its Fibres contract in three four places, and form what they en Glandula Myrtiformes.

A little beyond the Clitoris, 1 fore-part of the Vulva, above the sins of the Womb, there is a little Ed SING

Of the Parts of Generation Grethra.

which is the Orifice of the Vrethra: It is naturally fo large as to receive a Probeas big as a Goose-quill. The Length of the Neck of the Bladder is near about two fingers breadth. It has a little Muscle called its Sphineter, which embraces the Vrethra, to hinder the involuntary running of the Urine; it joins the fleshy Fibres which are at the Orifice of the Vagina.

Between this Muscle and the inner Membrane of the Vagina there are several little Glands, whose Excretory Duets are called Lacuna; they pour a viscous Liquor, for the tickling of the Sex, into the lower part of the Vulva. These Glands are the Seat of Gonorrhoea's in Women, as the Proftate are in Men. have the fame use that they have han been found all ulcerate in Women

which have had a Gonorrhoea.

The Vagina, or Neck of the Womb, is a long and round Canal, which reaches from the Pudendum to the internal Mouth of the Womb. In Maids 'tis about five fingers breadth long, and one .Ed a half wide; but in Women who Sere born Children, its length and bigness gionot be determined, because it lengththe the time a Woman is with Child, long t dilates in the time of Birth. Mustles, twoetwixt the Bladder and the Rectum, tuh which last it is wrapt up in the fame

fame common Membrane from the Peritoneum; for this reason the Excrements come out sometimes by the Vulva, when this Intestine is wounded.

The Substance of the Vagina is composed of two Membranes, of which the inner which lines its Cavity, is nervous and full of wrinkles and Sulci, especially in its fore-part. It has three or four small Glands on that side next the Rectum, which pour into it a viscous humour in the time of Coition, of which we have spoken before.

The Wrinkles of this Membrane, are for the Friction of the Balanus, to encrease the Pleasure in Copulation, to detain the Seed that it run not out again, and that it may extend in the time of

Gestation.

The External Membrane of the Vagina is made of Muscular Fibres, which (as occasion requires) dilate and contract, become long and short for adjusting its Cavity to the length and bigness of the Yard. At its lower part there is a Muscule of circular Fibres, like a Sphincter, and under it on each side of the Vagina, a Net-like Plexus of Blood-Vessels, which, with the Muscle, helps to straiten the Mouth of the Vagina, that it may grasp the Yard closely.

The Neck of the Womb receives Veins and Arteries from the Hypogastrick and

the Hæmorrhoidal Vessels. Those from the Hypogastrick are dispersed in its upper part, and those from the Hæmorrhoidal in its lower part. These Vessels communicate with one another. It has Nerves from the Os Sacrum. Amongst other uses, the Neck of the Matrix serves for a Conduit to the Menstrua, and for a Passage to the Fætus.

the Situa. The

The Matrix or Womb is situated in the lower part of the Hypogastrium, betwixt the Bladder and the Straight Gut; the Os Pubis is a sence to it before, the Sacrum behind, and the Ilium on each side; they form as it were a bason for it; but because it must swell whilst a Woman is with Child, therefore they leave a greater space in them than in Men; it is for this reason that Women are bigger in the haunches than Men.

its Figure.

of the

The Figure of the Womb is like a Pear, from its internal Orifice to its bottom, 'tis three fingers long, two broad, and almost as much thick. In Maids its Cavity will contain a big Almond: It changes both figure and dimensions in Women that are with Child; it presses the Bowels, and reaches to the Navel towards their Delivery, whilst at other times it does not pass the Os Sacram.

and Arteries from the

The Womb is covered with the Peri- of its Subtonaum. Its Substance is composed of stance.
Fleshy Fibres, which are woven together
like a Net, and they draw together and
make several Bundles, which have several
Directions for the better contracting of
the Womb in the expulsion of the Fætus.
The Spaces between these Fibres, are fill'd
up with thin and soft Membranes, which
form an infinite number of Cells, upon
which the Blood-Vessels run; turning and
winding in great abundance. Upon these
Membranes, especially towards the Cavity
of the Womb, there are several Glands
which separate an humour to substicate
the Cavity of the Womb.

The Bottom of the Womb grows thick, as it dilates; so that in the last Months of Gestation, 'tis at least an inch thick, where the *Placenta* adheres, because its roots run into the Substance of

the Womb.

The Entry into the Cavity, or the Mouth of the Womb, joins the upper end of the Vagina, and makes a little Protuberance in the form of Lips, which resembles the Muzzle of a little Dog, by some called Os Tinca. The Cavity of the Womb next its internal Orifice being more contracted than it is near its Bottom, is called Collum Minus Oteri. Its Surface is unequal, and amongst its Ruga, open several small Ducts which discharge a glutinous

glutinous Liquor to feal up the Mouth of the Womb in Gestation. These Ducts are affected in a Fluor Albus.

its Vessels. The Veins and Arteries of the Womb are branches of the Hypogastrick and Spermatick Vessels, whose larger ramisications inosculate with one another; the Spermatick Artery with the Hypogastrick, and the Vein with the Vein, as also the branches of one fide of the Womb with those of the other. When the term of Accretion draws to a period, and the Blood which was wont to be spent in the encrease of the Body, being accumulated, distends the Vessels, it breaks forth once a Month at those of the Womb, because of all the Veins in the Body which stand perpendicular to the Horizon, these only are without Valves. This Evacuation is is called the Menstrua, to which Men for the same reason are subject, but in them the redundant humour passes off by Urine as Sanctorius observes, and rarely by the Hæmorrhoidal Veins.

> Its Nerves come from the Intercostals. and from those which come from the Os Sacrum. There are also several Lymphaticks upon its outfide, which unite by little and little into great branches, and discharge themselves in the Reservatory of the Chyle. All the Vessels of the Womb creep upon it by many turnings and windings, that they may not break when it is distended. The

The Womb is tied by two forts of Liga- of in Ligaments; by two broad, call'd Ligamenta ments.

Lata; and by two round, call'd Ligamenta Rotunda. The two broad Ligaments are only a Production or Continuation of the Peritonaum from the fides of the Womb: for their largeness and figure, they are commonly compar'd to the Wings of a Bat. The Ovaria are fasten'd

lopiana run along the other.

The two round Ligaments rife from the fore and lateral part of the bottom of the Womb, and pass, in the Productions of the Peritonaum, through the rings of the oblique and transverse Muscles of the Abdomen to the Os Pubis, where they expand like a Goose Foot, and are partly inserted in the Os Pubis, and partly continued or joined to the Mulculus Membranosus or Fascia Lata, on the upper part of the infide of the Thigh : from thence comes the Pain that Women big with Child feel in this place. The Substance of these Ligaments is hard, but covered with a great number of Blood-Vessels: they are pretty big at the bottom of the Womb, but they grow smaller and flatter as they approach the Os Pubis.

to one end of them, and the Tuba Fal-

The Spermatick Vessels in Women are of the Sperfour, as in Men; they differ only in this, matick Vessel that they are shorter, that the Artery makes makes feveral turnings and windings as it goes down, that it divides into two branches, of which the smallest goes to the Ovarium, the biggest divides into three more, of which one is bestowed upon the Womb, another upon the Vagina, and the third upon the Ligaments of the Womb and Tube Fallopiane : tis the fame as to the Vein.

the Situaand Fiof the

The Ovaria are tied about two fingers distance from the bottom of the Womb by the Ligamenta Lata. They are fixed to the Peritonaum at the Ilia by the Spermatick Veffels. They are of an Oval figure, a little flat upon their upper part, where the Spermatick Vessels enter.

The Ovaria or Testicles are near half as big as Mens are; their Surface is unequal and wrinkled in Old Women, but smooth and equal in Maids; they are eir Mem- cover'd with a proper Membrane, which sticks close to their Substance, and with another common from the Peritonaum, which covers also the Spermatick Vessels. Their Substance is composed of Fibres and Membranes, which leave little spaces in which there are several small Vesicles. round, full of water, which being boil'd, hardens like the White of an Egg; they have each of them two proper Membranes, upon which there are feveral small twigs of Veins, Arteries, and Nerves. These Vesicles are call'd Eggs, and they

and

are of a different fize, and number, in Women of different Ages. We observe in Cows, that such of them as are impregnant after Copulation, are contained or covered all over with a yellow Substance, which has a small hole in its side, through which they are thrust when they fall into the Tuba Fallopians. Besides the Spermatick Vessels, the Ovaria have Nerves from the Intercostals and Lymphaticks, which discharge themselves into the common Receptacle.

The Tuba Fallopiana are situated on of the Tub

the right and left fide of the Womb; Fallepianse, they rife from its bottom by a narrow beginning, and they dilate in form of a Trumpet to their Extremities, where they are contracted again into a small Orifice, from whole circumference they dilate into a pretty broad Membrane. which looks as if it were torn at its edges, therefore call'd Morfus Diaboli. Their Cavity, where they open into the Womb, will scarcely admit of a Hog's-Briftle; but at its widest part, it will take in the end of one's Little finger. Their Substance is composed of two Membranes, which come from the External and Internal Membranes of the Womb. The Tubes are about four or five fingers breadth long; they have the fame Veins, Arteries, Nerves and Lymphaticks as the Ovaria. These

are all the Parts of Generation in Women.

e Use of ese Parts in peration.

So great is the Pleasure in the Act of Generation, that it alters the course of the Blood and Animal Spirits, which then move all the above-described Parts, which before lie quiet and at rest. The Clitoris is Erected, which by its Exquisite Sense affords a great deal of Delight; the Glands about the Neck of the Womb, being pressed by the swelling of the neighbouring Parts, pour forth a Liquor to facilitate the Passage of the Yard, and to encrease the Pleasure. The Neck of the Womb contracts and embraces closely the Yard; the Fibres of the Womb contract and open its Mouth (which at other times is extremely close) for the reception of the Spirituous part of the Seed; and the branches of the Spermatick Artery which run upon the Ligamenta Lata, between the Ovaria and the Tuba Fallopiana, being distended with Blood, contract and pull the Extremities of the Tubes to the Ovaria, for the carrying the Seed to them. The Seed impregnates the Egg, which, from being transparent, becomes opake some time after; 'tis cover'd with a thick and yellow Substance which presses it on all sides, and thrusts it out through a little hole in its middle; fo it falls into the Orifice of the Tubes, which dilate sufficiently for its passage into the Womb. Some

Some, partly confidering the closeness of the Mouth of the Womb, and partly the thickness of the Membranes of the Ovaria and Ova, do judge it impossible for the Seed to pass this way; therefore they think that it is taken up by the Veins which open in the Cavity of the Vagina and Matrix, where circulating, it ferments with the mass of Blood; from thence come all those Symptoms which appear in Conception: it enters and impregnates the Egg by the fmall twigs which are upon its Mem-This Fermentation swells the Membranes of the Tuba, opens the Cavity of the Words, and makes every thing ready for the reception of the Egg.

SECT. XVII.

The Generation of the Fœtus; Of the Ombilical Vessels; Of the Placenta; Of the Posture of the Fœtus, and term of Delivery.

THE great and many Difficulties which attend the most plausible Account of the first Formation of the Parts of an Animal, and beginning of Motion in its Fluids; and the nice and curious Observations of Redi Leeuwenhoek and Others; have been sufficient Motives to most of the Moderns to throw off the Notion of Equivocal Generation. But though

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though both Reason and Experiments convince us, that all the Parts of an Animal did exist, and its Fluids were in motion before Generation; yet whether the Animalcule was lodged in the Seed of the Male or Female Ova, is Matter of Controversie. The Arguments strongly alledged on both fides persuade me of the truth of what Dr. Garden fays, that the Female Ovum is a proper Nidus for the Animalcula in semine. It is amazing to fee the prodigious number of little Creatures like to many Tadpoles swimming every way in the Male Sperm of all Animals: Nor is it less curious to observe their Languid Motion in fuch as are poxed, and how they recover their former briskness as the distemper abates. Leenwenhoek tells us of one whose Wife for some years did not conceive, because there were Animalcula to be found in his Seed there being no other visible hinderance on either side. These Animals are so small that 300000000 of them are not equal to a grain of Sand, whose diameter is but the to part of an Inch. Whilst the Seed thus abounds with Animalcula, there are not the least rudiments of an Ahimal to be feen in any part of the Ovaria: yet these likewise have a principal part in Generation, for without them there is no Conception; and even Bitches which have been Spatied forget

their usual Appetites, as if they were the only Spurs to Venery. The Yellow Substance which grows in the Ovaria of Cows, upon Conception, is very remarkable: It has a small Dint, and a Cicatrice in its middle, as if the Ovum had dropt out there, (as Malpighius thinks.) When the Fætus is very small, I have observ'd it very large; but as the Fatus grows bigger and bigger, this decays, and, I think, at last, even vanishes: nor is it to be feen before Conception, and in one Testicle only, when there is but one Calf. If all the Animacula, or a great many of them, did fasten and grow to the Womb, till fuch time as by their bigness, or want of Nourishment, they made one another drop off, (as Leeuwenhoek thinks) Women could not but be sensible of their Evacuation, for they must be falling off, through the whole time of their being with Child. But when the Animalcule gets into an Ovum fit to receive it, and this falls through one of the Tube Fallopiane into the Womb, the Humours which diffill through the Vessels of the Womb, penetrating the Coats of the Egg, swell and dilate it, as the Sap of Earth does Seed thrown into the Ground. Or elfe the branches of the Veins and Arteries, whereby the Egg was tied in the Ovarium (which probably make the Umbilical Vessels)

Vessels) being broken, fasten with the Vessels of the Womb: then the Placenta begins to appear like a little Cloud upon one fide of the External Coat of the Egg; and at the same time the Spine of the Embryo is grown so big, as to be visible; and a little after the Cerebrum and Cerebellum appear like two small Bladders, and the Eves next stand goggling out of the Head; then the Beating of the Heart, or Punctum Saliens, is plainly to be seen; and the Extremities discover themselves last of all.

Now the Membranes which involve the Fætus are the same with the Coats of the Egg. The External is call'd Chorion; it is pretty thick, and a little rough on its outfide to which the Placenta adheres. It embraces immediately the Amnion, or Internal Membrane, which is a fine and delicate Bag full of a clear Liquor, in the middle of which the Fætus swims. This Liquor is separated, for the Nourishment of the Fætus, by the Glands of the Amnion, from its Blood-Vessels, which are fine branches of the Umbilical Vein and Arteries.

The Arteries rife from the extremity of the Aorta, or the beginning of the Iliacks of the Fætus; and paffing by the fides of the Bladder to the Navel. through which they pals, they give some branches to the Amnion and Chorion,

Of the Chorion.

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Of the Generation of the Fœtus, &c.

The Fætus is almost of an Oval figure of the Posture whilst it lies in the Womb, for its Head of the Foctus. hangs down with its Chin upon its Breast; its Back is round; with its Arms it embraces its Knees, which are drawn up to its Belly; and its Heels are close to its Buttocks, its Head upwards, and its Face is towards its Mother's Belly. But about the Ninth Month, its Head, which was always specifically lighter than any other Part, becomes specifically heavier, its Bulk bearing a much finaller proportion to its Substance than it did, and consequently it must tumble in the Liquor which contains it; fo its Head falls down, its Feet get up, and its Face turns towards its Mother's Back: but because then it is an irksom, though favourable Posture for its Exit, the motion it makes for its relief. give frequent Pains to its Mother, which causes a Contraction of the Womb, for the Expulsion of the Fætus. When the Child prefents in any other Posture, it should be carefully put back again, and, if possible, turn'd to the right way: If that can't be done, it should be brought out by the Feet.

CHAP. III.

Of the Thorax, or Middle Cavity.

S E C T. I. Of the Breasts.

Aving already describ'd the Figure, Bounds, and External Parts of the Thorax, we come now to examine the Substance and Use of its several Parts; amongst which, the first that presents it self is the Breasts.

The Substance of the Breasts is composed of a great number of Glands of an Oval Figure, which lie in a great quantity of Fat. Their Excretory Ducts, as they approach the Nipple, join and unite together, till at last they form seven, eight. or more small Pipes call'd Tubuli Lastiferi, which have several cross Canals by which they communicate with one another, that if any one of them be stopt, the Milk which was brought to it might not stagnate, but pass through by the other Pipes, which all terminate in the Extremity of the Nipple.

The

The Nipple is a Spongious Substance, made of two orders of Fibres: the imalleft make a fine Net-work within the larger spaces of the Net-work of the bigger Fibres. Through it pass the Tubuli Lattiferi, which grow smaller and smaller to their Extremities, that the Milk might not run out but when the Breasts are full, or upon Suction: It has an Exquisite Sense, and a small Erection when it is handled.

The Arteries and Veins of the Breafts are Branches of the Subclavian and Intercostal. They have Nerves from the Vertebral Pairs, and from the fixth Pair

of the Brain.

The Use of the Breasts is to separate the Milk for the Nourishment of the Fætus. The Arteries which terminate in the Glands, which compose the Substance of the Breasts, bring the Blood pregnate with a Chyle which has received its last Perfection by its Circulation through the Lungs; this Chyle being separated by the Glands of the Breasts, runs through the Tubuli Lactiferi upon the Suction of the Child.

The Breasts in Men are very small, they are chiefly for an Ornament. I have seen some Men who have had Milk

in them. to Me no puo sa un volta salimbent

SECT. II.

Of the Diaphragma, or Midriff.

Bones which compose the forepart of the Thorax; these are described in their proper places: Having therefore cut them up, and laid the Cavity of the Thorax open, the Diaphragma, Pleura, Mediastinum, Heart, and Lungs appear.

of the two Mufcles which compose the Midriff.

The Diaphragma is composed of two Muscles, which divide the middle from the lower Cavity. The first and Superiour Muscle arises from the Sternum and the ends of the last Ribs, on each side. Its Fibres, from this semi-circular Origination, tend towards their Centre, and terminate in a Tendon or Aponeurosis, which hath always been taken for the nervous part of the Midriff. The fecond and Inferiour Muscle comes from the Vertebræ of the Loins, by two Productions, of which that on the right fide comes from the first, second and third Vertebra of the Loins; that on the left fide is somewhat shorter; and both these Productions join and make the lower part of the Midriff, which joins its Tendon with the Tendon of the other, so as that they make but one Membrane, or rather Partition.

The

The Midriff is cover'd with a Membrane from the Pleura on its upper fide. and by the Peritonaum on its lower fide; it is pierced in its middle, for the Passage of the Vena Cava: in its lower part, for the Oesophagus; and the Nerves which go to the upper Orifice of the Stomach. and betwixt the Productions of the Inferiour Muscle, passes the Aorta, the Thoracick Duct, and the Vena Azygos.

The Midriff receives Arteries and of its Vessels. Veins call'd Phrenica from the Cava and Aorta; and sometimes on its lower part, two Branches from the Vena Adiposa, and two Arteries from the Lumbares. It has two Nerves which come from the third Vertebra of the Neck. which pass through the Cavity of the Thorax, and are dispersed in the Muscles

of the Midriff.

The Midriff, in its natural fituation, of in vi is Convex on the upper fide towards the Breast, and Concave on its lower fide towards the Belly: therefore when its Fibres swell and contract, it must become plain on each fide, and confequently the Cavity of the Breast is enlarged, to give liberty to the Lungs to receive the Air in the Inspiration; and the Stomach and Intestines are pressed for the distributtion of the Chyle; but it diminishes the Cavity of the Breast, when it refumes its natural Situation, and

and presses the Lungs, for the Expulsion of the Air in Expiration.

SECT. III.

Of the Pleura, Mediastinum, and Thymus.

The Pleura is a double Membrane which covers all the Cavity of the Thorax; it arises from the Vertebra of the Back, ascends on each side upon the Ribs to the middle of the Sternum. It is fixed to the Periosteum of the Ribs to the internal Intercostal Muscles, and it covers the Midriff. Its side towards the Cavity is smooth and equal, but that which is fixed to the Ribs is rough.

of the Media-

The Mediastinum is a double Membrane, formed by the continuation of the Pleura, which comes from the Sternum, and goes straight down through the middle of the Thorax to the Vertebra, dividing the Cavity in two. It contains, in its doubling, the Heart; in its Pericardium, the Vena Cava, the Oesophagus, and the Stomachick Nerves. The Membranes of the Mediastinum are finer and thinner than the Pleura, and they have a little Fat. The Mediastinum receives branches of Veins and Arteries from the Mammillary and Diaphragmatick, and one Proper, call'd Mediastina; its Nerves

come

come from the Stomachick; it has also fome Lymphaticks which open in the Thoracick Duct. The Mediastinum divides the Thrax into two parts, to the end that one Lobe of the Lungs may officiate, if the other be hindred by a Wound on the other side of the Thorax. Sometimes there is a Matter contained betwixt its Membranes immediately under the Sternum, which may occasion the Trepaning of this place.

The Thymus is a Conglobate Gland of the Thy

fituated in the upper part of the Thorax musunder the Clavicula, where the Cava and Aorta divide into the Subclavian Branches. This Gland is big in Infants, but as they grow in Age, it grows lefs. Its Arteries and Veins are branches of the Carotides and Jugulars. It has Nerves from the Par Vagum, and its Lymphatick Vessels discharge themselves

in the Ductus Thoracicus.

The learned Dr. Tyfon supposes the Use of this Gland to be for a Diverticulum to the Chyle in the Thoracick-Duct of a Fætus, whose Stomach being always full of the Liquor in which it swims, must keep the Thoracick-Duct distended with Chyle; because the Blood which the Fætus receives from the Mother fills its Veins, and hinders the free entrance of the Chyle into the Subclavian Vein. Nor can any Argument

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ment be drawn from the Valves in the Lympheducts of the Thymus, against this Opinion; for I have more than once Injected them with Wax up to the Thymus, by the Thoracick Duct, as Mr. Comper likewise observes.

SECT. IV.

Of the Pericardium, Heart, and its Parts.

Of the Pericardium.

THE Pericardium is a thick Membrane of a Conick figure, it refembles a Purse, and contains the Heart in its Cavity. Its Basis is pierced in five places, for the paffage of the Veffels, which enter and come out of the Heart; It lies in the Duplicature of the Mediafinum, which firmly adheres to it, as its Point does to the middle Tendon of the Midriff. It receives its Veffels from the Mammary and Phrenica. Nerves from the Recurrent and Diaphragmatick. It has Lymphaticks, which discharge themfelves in the Thoracick-Duct.

ntained in be Pericarium.

of the Water The Use of the Pericardium is to con. tain a spoonful or two of a clear Water, which is separated by some small Glands in the Pericardium, that the Surface of the Heart may not grow dry by its continual Motion

d Connexion the Heart.

the Situa- The Heart is fituated in the middle of the Thorax, between the two Lobes of the the Lungs; it is of a Conick figure, whose Basis is the upper end, and its Apex or Point is the lower end, which is turned a little to the left side, that the Right Auricle may be lower than the Left; by which means the refluent Blood in the Cava ascends the more easily; for, like other Liquors, the Blood will rise to the same height in both Legs of a reflex Tube. For the same reason, the Aorta runs sirst upwards, before it turns down, that the force of the returning Blood from the

lower Parts may be the greater.

The Heart is tied to the Mediastinum. to the Pericardium, and fustained by the great Veffels which bring and carry back the Blood. It is cover'd by a Membrane, which is the Proper Membrane of the Muscles; its Basis is always furrounded with Fat. It has two Veins, of its Veffels which open into the Cava, immediately before it empties it self into the Auricle. and they are accompanied with two Arteries from the Aorta, which run through all the Substance of the Heart; they are call'd the Corona-Vessels. The Arteries bring the Blood for the Nutrition and Motion of the Heart, and the Veins carry back what remains. The Branches of the Veins on the Right fide communicate with those of the Left. In like manner do the Arteries of each fide

commu-

communicate with one another; and it is the fame, though not every where fo evident, in all the Parts of the Body. The Heart receives a multitude of small Nerves from the Eighth Pair, particularly they creep in great numbers about the Aorta, and on the left Ventricle. It has also some Lymphaticks, which discharge themselves in the Thoracick Duct.

the Auri- At the Basis of the Heart there are two Auricula or little Ears, one on the right, the other on the left fide. the right Ear opens the Vena Cava, in the left the Vena Pulmonalis: The first discharges the Blood that it receives from the Cava into the Right Ventricle, and the second thrusts the Blood that comes from the Vena Pulmovalis into the Left Ventricle. The Left is less, but thicker than the Right. Their Substance is composed of two orders of Muscular Fibres, which terminate in the Tendon in the Basis of the Heart; and at the right Ear there is a Circle like to a Tendon, where the Cava ends. Their External Surface is smooth; their Internal is unequal, full of small fleshy Pillars, which send out small Fibres that cross and go thwart one another; and betwixt these Pillars there are as many Furrows; they receive Nerves from the branches of the Eighth Pair. Pair. They have the same motions of Systole and Diastole as the Heart, which we shall explain afterwards. Their Use Their Use is to receive the Blood, which is brought by the Vena Cava and Pulmonalis, and by them to be thrust into the Ventricles of the Heart.

In the Heart there are two Cavities or of the Ventra-Ventricles, which answer to the two cles of the Ears, one on each fide; the fides of Heart. these Cavities are very unequal, full of Fibres and little fleshy Productions, long and round, of a different figure and bigness, call'd Columna or Pillars. Betwixt these Fibres there are several furrows in the fides of the Ventricles, especially in the left Ventricle, they are deeper and larger; they contribute much to the close contraction of the Ventricles. And because the fide of the right Ventricle is much thinner than the left, therefore there is often a small bundle of fleshy Fibres, which come from the middle partition to its opposite side, to hinder it from dilating too much.

The Right Ventricle seemeth wider than the Lest, which is longer and narrower than the Right, and its sides stronger and thicker. The two Ventricles are separated by the Septum Medium, which is properly the inside of the lest Ventricle, being its Fibres are continued with the Fibres of the oppo-

ite

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fite fide of the fame Ventricle. The Veffels which enter and come out of the Heart, are the Vena Cava, the Arteria, and Vena Pulmonalis, and the Aorta or Arteria Magna.

Of the Right Ventricle, and of its Values.

The Right Ventricle receives the Blood from the Vena Cava, through the right Ear : and at the mouth of the Ventricle there are placed three Valves, made of a thin Membrane; they are of a triangular figure, and are call'd Tricuspides; their Bases are fix'd to the mouth of the Ventricle, and their Points and Sides tied by small Fibres to the fleshy Productions. So that when the Ventricle contracts, and the opposite sides approach one another, the points of the Valves meet, and their lateral Strings being relaxed, their fides are likewife made to join one another by the Blood which gets between them and the fides of the Ventricle; the three Valves thus united, form a concave Cone which hinders the return of the Blood to the Auricle. It is therefore thrust out at

the Values ulmonalis.

The Arteria Pulmonalis, which rifes the Arteria immediately out of the Right Ventricle; its Mouth is less than the Cava; it has three Valves, call'd Segmoidales, or Semilunares, because they resemble a Half-Moon, or Segment of a Circle; their Substance is Membranous. When they separate, they give passage to the Blood, from

from the Ventricle into the Artery; but they shut the Passage, and are thrust together by the Blood, if it endeavours to return. The Arteria Pulmonalis carries the Blood to

The Vena Pulmonalis, which discharges of the Valves it self through the left Ear into the Ven- of the Ventricle. Tricle of the same side. At the Orifice Ventricle of this Ventricle there are two Valves call'd Mitrales, because they resemble a Mitre; they are broader than the other Valves; they are situated and have the same Use as the Tricuspides in the Right Ventricle.

The Aorta, or Great Artery, rifes im- of the Value mediately out of the Left Ventricle; it of the Aorta, has three Valves, which have the same Use and Figure as the Semi lunares in the Arteria Pulmonalis.

The Heart is a compound Muscle; of the Sul its Substance is made of Fibres of the stance of the same Nature as those of other Muscles: Heart, and of the Nature are several Orders of them, which its Fibres. have different Directions, and all their Tendons are in the Basis of the Heart. The sirst, or External Order, is of Fibres, which surround the whole Heart; they go in an Oblique or Spiral Line from the left to the right, except on the Surface of the right side; some of its sinest Fibres go in a straight Line from the Basis to the Point. The second or next Order surrounds also the whole

whole Heart; they have a contrary Direction, which is from the Right to the Left in an Oblique or Spiral Line. The next Orders are only proper to the Left Ventricle. The first, which is on the external side of the Ventricle, goes in an Oblique Line from the Left to the Right. The second Order is on the inside, or that which makes the Septum Medium, or Partition-Wall of the Ventricles; they go in an Oblique Line from the Right to the Left, and they are continued with the foregoing Fibres at the Point of the Heart.

All these Orders of Fibres come together, as to one common Centre, at the

Point of the Heart : But,

Obs. That all the Fibres of the same Order, do not always go from the Basis to the Point; for some, after they have . gone about half way obliquely from the one fide, turn up obliquely, and are inserted in the Basis on the other side. Neither do all the Fibres in the fame order keep together, for some intermix with the Fibres of the next Order; fo, in feparating these Orders, many Fibres are broken. Some of the Fibres in the Internal Orders, proper to the Left Ventricle, terminate in the fleshy Productions of the same Ventricle. The Bone which is found in the Basis of the Hearts of several Beasts, is nothing but the Tendons stort w

Tendons of the Fibres of the Heart offify'd: it is sometimes found in Men.

This Muscle has two Motions, which of the Systole they call Systole and Diastole. The Systole and Diastole is when the Fibres of the Heart contract, of the Heart. its Sides swell, and its Cavities are strongly press'd on all sides. The Diastole is when this Muscle ceaseth to act; its Fibres are lengthened, its Sides fall, and

its Cavities become large and wide.

Having describ'd the Heart and its of the Circu-Parts, let us now consider the Circula-lation of the tion of the Blood, which is performed Blood through by means of this Muscle. The Vena Cava Ascendens and Descendens unite in one, and open into the right Ear, where they unite; there is a little Protuberance made by their Coats on the infide of the Canal like an Isthmus, which directs the Blood both of the one and the other into the Ear, and so hinders them from rushing one upon another. The right Ear in its Diastole receives the Blood from the Vena Cava, which by its Systole is thrust into the right Ventricle; (for the tendinous Circle which is at the Mouth of the Cava contracts, and hinders the Blood to return into it) which at the same time is in its Diastole. In the Systole of the right Ventricle the Blood is thrust into the Arteria Pulmanalis, (for it cannot return into the Ear, because

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because of the Valvula Tricuspides) which communicates with the Vena Pulmonalis. which carries back the Blood into the left Ear, which in its Systole thrusts the Blocd into the left Ventricle, which is then in its Diastole. In the Systole of this Ventricle the Blood is thrust into the Aorta, (for it cannot return into the Ear, because of the Valunta Mitrales) which carries it through all the Body. Now the Aorta, when it comes out of the Heart, ascends a little upwards, and then turns downwards to form the descending Trunk, for the reason already given; and from the upper fide of this turning the Cervical and Axillary Vessels do arise: by this artifice the Blood collides against the fides of the Aorta; its force is broken, part of it is taken in by the mouths of the ascending branches, but its greatest part is directed downwards.

From what has been said, it appears, that both Auricles contract at the same time, as likewise do the Ventricles; and that when the Auricles are contracted, the Ventricles are dilated, & vice versa. To account for this Alternate Motion of the Auricles and Ventricles, let us suppose them all full of Blood: And that what-soever the cause of the Contraction of the Heart is (whether it be the Blood, or Animal Spirits, or perhaps both, which

is not our present Enquiry) it is not continued, but acts by Impulses, as appears from the Systole and Diastole of the Heart. Now though this Cause might at first act both upon the Auricles and Ventricles at the same time, yet its Action must necessarily become alternate; for the strength of the Ventricles being greater than that of the Auricles, they contract; and by their contraction, hinder that of the Auricles, which endeavour likewise to expell the Blood by which they are distended, but cannot perform it till the dilatation of the Ventricles makes room for its reception.

Let us now consider which way the of the circum Blood circulates in the Fætus; for this lation of the you must observe, that in the right focus. Ear, on the lower side of the Protuberance of the Cava, just opposite to the mouth of the Cava Ascendens, there is a Hole call'd the Foramen Ovale, which opens into the Vena Pulmonalis; this Hole has a Valve which suffers the Blood to enter the Vein, but hinders it to come back again. There is likewise a Passage or Canal which runs from the Trunk of the Arteria Pulmonalis to the

Now the Blood which comes from the Placenta, by the Umbilical Vein, into the Porta, is fent into the Cava

Trunk of the Aorta.

by.

by a Canal which goes straight from the Trunk of the Porta to the Trunk of the Cava in the Liver. This ascends the Vena Cava, and is directly thrown through the Foramen Ovale, into the Vena Pulmonalis, which carries it into the left Ventricle, which throws it into the Aorta, to be distributed through all the Body. But the Blood which comes down the Vena Cava Descendens is diverted by the Isthmus of the Cava, from the Foramen Ovale, and falls into the right Ventricle, which thrusts it into the Arteria Pulmonalis, from whence part of it is immediately carry'd by the communicating Canal into the Aorta. The reason of these Passages in a Fætus, was, because the Blood could not all pass through the Pulmonary Blood-Vessels, they being too much compressed by the Substance of the Lungs; but as foon as the child is born, and the pressure is taken off from the Blood-Vessels by the distension of the Lungs with Air, the Blood finding a free passage through the Lungs, runs no more by the communicating Canal, whose direction likewise is not now to favourable for its reception as before; because the Pulmonary Artery being stretched out with the Lungs, makes it go off at right Angles, and therefore it dries up. And now the Pulmonary Vein being distended with the

the greater quantity of Blood which it receives from the Lungs, the Valve of the Foramen Ovale is pressed close to its Sides, denying a passage to the Blood from the Cava, to be mix'd with the rest of the Blood. By this you see, that the Blood which comes from the Vena Cava Descendens passes only through the left Ventricle, whilst the Blood which comes from the Cava Ascendens passes only through the right Ventricle.

Thus having shewed what way and by what means the Blood circulates through the Heart; let us now reflect a little upon the Quickness of its Motion. Each Ventricle will at least contain an Ounce of Blood, and therefore we may fafely suppose that the Heart throws into the Arta an Ounce of Blood every time it contracts. The Heart contracts 4000 times in one Hour, or fometimes more, and fometimes less, according to the different Temperaments, Sexes and Ages: From which, it follows, that there passes through the Heart every Hour 4000 Ounces, or 350 Pound of Blood. Now the whole mass of Blood is said to be about 25 Pound; so that a quantity of Blood equal to the whole mass of Blood passes through the Heart 14 times in one Hour, which is about once every four Minutes. I fay, a quan-

118 Of the Pericardium, Heart, &c.

a quantity which is equal to the whole mass of Blood, and not the whole mass it self; for it is not to be supposed that the Blood which goes to the Extremities can return to the Heart, as soon as the Blood which goes only to the

Kidneys or Liver.

The Velocity and quantity of Blood. together with the time it takes to run in different Blood-Vessels, differ according to the different lengths and orifices of the Vessels, according to the greater and leffer compression the Vessels receive in the different Parts through which they run, according to different quantity of Secretions from the Vessels in the feveral Parts of the Body, according as the Veffels have more or less turnings and windings, and according as they divide into more or tewer Branches. These things determinate the Velocity. Time, and Quantity of Blood in the feveral Veffels of the Body.

In the Blood there is much Volatile Salt and Spirits, some Phlegm and Sulphur, a little Earth, but little or no Fix'd Salt. Alcali's dissolve it, and

To estimite once where the telephone is

Acids coagulate it.

Ventricle; and Vena Pulmonalis, whose Trunk opens in the left Auricle of the Heart; each of these divides into two branches, for the two great Lobes of the Lungs, where they are sub-divided into as many branches as there are little Lobes or Vesicles in the Lungs. Whereever there is a branch of the Trachea, there there is a branch of the Vein and Artery; and the Trachea is always in the middle. Upon the Branches of the Trachea Arteria, which are called Bronchi, run a small Artery call'd (by Mr. Ruysh) Arteria Bronchialis, a small Vein which Sommichellius calls Vena Pneumonica. The Artery comes from the Aorta, and the Vein opens into the Subclavian. The Blood in the Arteria Pulmonalis being of the Nature of Venal Blood, and all Secretion being perform'd in the Arteries, the Nourishment for the Lungs must be brought by the Arteria Bronchialis. There is the same contrivance for the Nutrition of the Liver. Upon the Bronchi, even to their minutest Ramifications, run likewife the fine Threads of the Eighth Pair of Nerves. Besides these, the Lungs have Lymphaticks, which discharge themselves into the Thoracick Duck; but they are smaller, and make more frequent Inosculations than I have obferv d any where elfe.

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of the Trachea Arteria.

This is the Passage of the Vessels through the Lungs; but because the Trachea Arteria has a particular Structure, it demands a particular Examination. It is a Canal fituated in the forepart of the Neck, before the Oefephagus; its upper end is call'd Larynx. from thence it descends to the fourth

lages.

Vertebra of the Back, where it divides, of its Carti- and enters the Lungs. This Canal is made of Annular Cartilages, which are at small and equal distances from one another, These Cartilages grow smaller and smaller as they approach the Lungs; and those of the Bronchi are so close to one another, that, in Expiration, the fecond enters within the first, and the third within the fecond, and fo the following always enters the preceeding. Betwixt the Larynx and the Lungs these Cartilages make not compleat Rings; but their hind part, which is contiguous to the Oefophagus, is membranous, that they may the better contract and dilate. and give way to the Aliments as they go down the Oesophagus. But the Cartilages of the Bronchi are compleatly Annular; yet their Capillary Branches have no Cartilages, but, instead of them. small Circular Ligaments which are at pretty large distances from one another. The Use of the Cartilages is to I ep the passage for the Air always open;

open; but in the Capillary Bronchi they would hinder the subsiding of the

Veficles.

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These Cartilages are tied together by of its Memtwo Membranes, the one External, and branes. the other Internal. The External is composed of circular Fibres; it covers the whole Trachea externally. The Internal is of an Exquifite Senfe, it covers the Cartilages internally. It is composed of three distinct Membranes: The first is woven of two Orders of Fibres. Those of the first Order are Longitudinal, for the shortening the Trachea; they make the Cartilages approach and enter one another. The other Order is of circular Fibres, for the contracting the Cartilages. When these two Orders of Fibres act, they help, with the External Membrane, in Expiration, in Coughing, and in altering the Note of our Voice. The second Membrane is altogether glandulous, and the Excretory Vessels of these Glands open in the Cavity of the Trachea; they separate a Liquor for the moistening the Cavity. and for defending it from the Acrimony of the Air. The third and last is a Net of Veins, Nerves, and Arreries. The Veins are Branches of the Vena Cava: the Nerves, of the Recurrent; and the Arteries, of the Carotides, and I do I do

the Lungs.

of the Use of From the Structure of the Lungs thus explain'd, the learned Pitcairn has mechanically deduced the great Effect they. by means of the Air, produce upon the Blood. For whilft the Fætus is in the Womb, the Vesicles of the Lungs lying flat upon one another, compress all the Capillary Blood-Veffels which are spread upon them: but as foon as we are born, the Air, by its Gravity and Elasticity, rushes into the empty Branches of the Trachea Arteria, and blows up the Vesicles into Spheres; by which means the compression being taken off from the Blood-Vessels, and they equally expanded with the Lungs. all the Blood has a free passage through the Pulmonary Artery. But when the Air is thrust out again by the contraction of the Cavity of the Thorax, it being a fluid body, compresses the Vesicles and Blood Vessels upon them every where equally. By this compression, the red globules of the Blood, which, through their languid motion in the Veins, were grown too big to circulate in the fine Capillary Vessels, are broken and divided again in the Serum, and the Blood made fit for Nutrition and Secretion. This pressure of the Air upon the Blood-Vessels, I have demonstrated to be equal to 100 Pound weight, and in Coughing or Crying it may exceed 400 Pound. But

But though these are the necessary Consequences of Respiration, yet several Experiments encline me to think that some particles of the Air must likewise enter the Blood-Vessels, and mix with the Blood in the Lungs. For, First, I am assured, from repeated Experiments. That Air will escape through the Pores of any number of Bladders, when compressed only by the weight of the Water into which it is funk; and therefore the pressure of 100 Pound weight, in ordinary Respiration, must thrust some particles of it into the Blood-Vessels. Secondly, The Honourable Mr. Boyle, in his New Pneumatical Experiments. shows us, That Animals cannot live when thut up in common Air, though, by a Gage, he has found it to retain its wonted pressure, and tho' the Receiver has been immers'd in Water cooled with a Solution of Sal-Armoniack. The fame Experiments affure us, That Animals will live longer shut up in compressed Air, than in common Air; and that when they are dying in the common Air, they may be revived by pressing in more fresh Air. Lastly, It may be demonstrated, That the difference between the Gravity of the Air in the City and that of the Country, (which can be but very small, upon the account of the Effluvia, as the Barometer shows it to

be) can never be cause of that Difficulty of Breathing which some have in the one, and not in the other; for they are not near so sensible of the different gravities of the Air in the same place, as they are of a much smaller difference in two distinct and remote places, where the Contents of the Air are different.

I could produce several other Arguments, but that I think these demonstrative; and therefore I shall only Answer one Objection, which is, That if the Air, in Inspiration, entred the Blood-Veffels, the Lungs could not be blown up; and, in Expiration, it will pass out through the open branches of the Trachea, rather than into small Vessels full of a denfe Fluid. Now if the Air pass'd as fast into the Blood Vessels, as it is drawn in by the Lungs, it is true, the Lungs could not be diftended; but if a few Particles only enter, this does not hinder their Diftention. But the Air does not enter the Blood-Vessels, in Infoiration, for it requires a confiderable Pressure to force it through their Pores: This therefore is done in Expiration, when the Air preffes the Lungs; for it it went eafily out again the way it came in, that necessary Attrition of the Blood could not be performed. CONTROL AS CHAILS

SECT. VI.

Of who Larging

THE Upper end of the Trachea Artic Situation. teria is call'd the Larynx. It lies below the root of the Tongue, before the Pharynx. It is compos'd of five Cartilages, which sometimes, in Old

Men, become as hard as Bones.

The First is the Ouggesdie, or Souti- of the Cartiformis, because of its Figure. It makes lago Scuti. that Protuberance in the forepart of formis, the Laryax call'd Pomum Adami. It is about an Inch broad, but not fo long. It's Concave within, and Convex without. Its four Angles have each a small Production; the two upper, which are longer, are tied to the Horns of the Os Hyoides, and the two lower to the fecond Cartilage, which is call'd Keinosid'is, or Annularis, because it refembles a Ring. of the An It's very large and thick behind, which part laris. is like the Stone of a Ring, and it grows narrower to its forepart; it's fituated below the other Cartilages of the Larynx, they stand upon it as upon a Basis, and by it they are tied to the Trachea.

The Third and Fourth are alike, and of the Aryon have one common Name, which is the noides. 'Apulauvoess's, they reach from the middle of the Concave fide of the Thyroides to the upper and back-part of the

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Annularis, and they make that Chink or Rimula, which is the Mouth of the Larynx, call'd Glottis. Betwixt those and the sides of the Thyroides there are two small Cavities on each side, form'd by the Muscles and Membranes which join them together; in which if a little Drink or Bread fall, as sometimes happens, when one laughs or speaks in eating or drinking, it causes a violent Cough, and a great Tickling.

Of the Epi-

The Fifth and last Cartilage, is the Epiglottis; it's of a softer Substance than the others; it resembles a little Tongue; it is tied by its basis to the upper and middle part of the Concave fide of the Thyroides: Its Use is to cover the Glottis in eating and drinking; for the Aliments, by their weight, press it close down upon the Glottis, and they pass over, without entring the Larynx, into the Oesophagus: but when the Aliments are past, the Epiglottis, by its natural refort, which is common to all Cartilages, lifts up again, and gives way to the Air, for the Respiration. When we Speak or Laugh, the Glottis must necesfarily be open for the passage of the Air; therefore it is not convenient to Speak, whilft we are Eating or Drinking.

of the Muscles The Larynx has two pair of Common

f the Larynx. Muscles, and five pair Proper.

The

The First of the Common Muscles Sternothyis the Sternothyroides; it arises from the roides,
upper part of the inside of the Sternum,
and ascending on the sides of the Trachea
Arteria, it is inserted to the lower part
of the sides of the Cartilago Scutiformis:
When these Muscles act, they pull this
Cartilage downwards.

The Second is the Hyothyroides; it Hyothyroiarises from the lower part of the Osdes. Hyoides, and descending, is inserted into the lower part of the Scutiformis, near the former: They pull up the

Larynx.

The First of the Proper Muscles is Cricothyrois the Cricothyroides; it ariseth from the des. forepart of the Cartilage Cricoides, and running under the Thyroides, it is inserted into the inside of that Cartilage.

The Second is the Crico-Arytanoides Crico-Ary.

Lateralis; it ariseth from the lateral penoides.

part of the Cricoides, and ascending, is inserted to the lateral part of the Arytanoides; this dilates the Arytanoides.

The Third is the Crico-Arytanoides Crico-Arytanoides; it arises from the back-part of noides, the Cartilage Cricoides, and is inserted into the Arytanoides, near the former.

The Fourth is the Thyro Arytanoides; Thyro Arytic ariseth from the internal and Concave tenoides fide of the Scutiformis, and is inserted into the foreparts of the Arytanoides; it contracts the Rimula.

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The

Arytænoides.

The Fifth Muscle is the Arytanoides; it runneth upon the upper part of the Cartilage Arytanoides, and, with its fellow, forms a Sphincter for contracting of the Rimula.

A true Squinzie, which is caused by the Inflammation of these Muscles, is Mortal; because they shut exactly the chink of the Larynx; therefore Bronchotomy is absolutely necessary in this case, but it is rarely, though it may be fately used.

Of the Veffels

The Larynx receives Veins from the f the Larynx. Jugulars, Arteries from the Carotides,

and Nerves from the Recurrent.

Of the Glan-

On the lower part of the Larynx, dulæ Thyroi- upon the fides of the Annulary Cartilage, and of the first ring of the Trachea, there are two Lymphatick Glands call'd Thyroidea; they are big and spongeous, of the figure of a Pear, their Colour is red; their Substance solid and viscous; they have Veins, Nerves and Arteries as the Larynx.

> The Use of the Larynx is not only to form the Voice, but also, by the different Apertures of its Rimula, the Lungs are more or less compress'd by the Air; for if the Aperture of the Larynx had been as wide as the Aspera Arteria, the Lungs could have suffer'd little or no com-

preffion.

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CHAP TO TOTAL

worken; of the Stuff we thall speak in

tell one through a find ciet.

Of the Upper Cavity, or Head.

them. Their Mirels He inmediately under the Stin. To J. Zent two are

Of the Frontal and Occipital Muscles; and of the Pericranium. thence they go thatghe up the Or Lade-

HE Head is fituated in the upper part of the Body, not only for the conveniency of the Senses, but also that the Brain may the more easily fend the Animal Spirits to.

all the Parts of the Body.

Its Natural Figure is round, but a little flat upon its Sides; round, that it might contain the greater quantity of Brains; and flat upon its fides, that the bounds of the Sight may be the larger, or rather, that the Ears might not be

too much exposed to danger.

We have divided the External Parts of the Head into two, the Face and the hairy Scalp; we shall now divide it into the Containing and the Contained Parts. The Containing Parts are the Skin with the Hair upon it, the Perioranium, the Skull, and the two Meninges. Of the Skin and Hair we have already fooken:

ranium.

spoken; of the Skull we shall speak in

its proper place.

Anatomists do generally say, that the Skull is cover'd both with a Pericranium and a Periosteum; but they have taken the Aponeurofis of the Occipital and Frontal Muscles for one of them. These Muscles lie immediately under the Skin. The first two are called Frontales. Their fleshy Fibres are inferted into the Eye-brows; from thence they go straight up the Os Frontis, and are continued by a long and large Aponeurofis to that of the Occipitales; they adhere closely to the Skin of the Forehead, which they pull upwards. The other two Muscles, which are call'd Occipitales, have their fleshy Fibres fixed to the Skin of the Hindhead, which they also pull upwards: They are short, broad, and thin, and they end in a large Aponeurofis, which joins that of the Frontals, and both together cover the whole Skull.

Therefore the Periosteum or Perithe Pericranium is a very thin and nervous Membrane, of an Exquisite Sense, which covers immediately not only the Cranium, but all the Bones of the Body, except the Teeth, and Bones of the Ear. It is tied to the Dura Mater by fome Fibres which pass through the Sutures of the Skull. It receives Veins

from

from the External Jugulars, Arteries from the Carotides, Nerves from the Fifth Pair of the Brain, and from the Second of the Neck.

SECT. II.

Of the Dura and Pia Mater.

THE Membranes or Meninges, which are within the Cranium, are two, the Dura Mater, and the Pia Mater; so call'd, because they are supposed to be the Origination of all the Membranes of

the Body.

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The Dura Mater is a strong and of the Dura thick Membrane which covers all the Mater. Cavity of the Cranium; it contains the whole Brain somewhat loosely, that the Vessels which run between its Duplicature, and upon the Surface of the Brain, be not too much pres'd by the Cranium; it sticks very close to the Basis of the Cranium, and to its Sutures, by the Fibres and Vessels it sends to the Pericranium; it is fasten'd to the Pia Mater, and to the Brain, by the Vessels which pass from the one to the other. It gives a Coat or Covering to all the Nerves which rife from the Brain to the Spinalis Medulla, and to all the Nerves which rife from it. Its Surface is rough towards the Cranium, but fmooth

134 Of the Dura and Pia Mater.

fmooth towards the Brain. It is a a double Membrane woven of strong Fibres, which may be plainly seen on its inside, but very hardly on its outside next the Cranium.

Of its Pro-

The Dura Mater hath three Proceffes made by the doubling of its inner Membrane. The First rifes by a narrow beginning from the Crista Galli, to which it is fastened, and as it approaches the hind-part of the Head it grows broader and broader, till it terminates where the Longitudinal Sinus ends. It divides the Cerebrum into two Hemispheres near as deep as the Corpus Callosum. It resembles a Sickle, therefore it is call'd Falx. The Second feparates the Cerebrum from the Cerebellum down to the Medulla Oblongata, that the weight of the Cerebrum may not offend the Cerebellum which lies under it; this Process is very strong and thick. and in ravenous Beafts 'tis for the most part bony, because of the violent motion of their Brain. The Third is the smallest; it separates the External Substance of the hinder part of the Cerebellum into two Protuberances; and upon it Monfieur Du Verney's Fifth Sinus runs.

of the Sinus's In the Dura Mater there are several for the Dura Sinus's or Chanels, which run between its External and Internal Membrane; of these there are four prin-

cipal

cipal ones, which are commonly defcribed.

The First is the Sinus Longitudinalis, First, Of the it rifes from the blind hole in the upper Longitudipart of the Crista Galli; it runs along the upper part of the Falx, and ends where it ends; it lies exactly under the Sutura Sagittalis. Into this Sinus the Veins of the Brain, and some of the proper Veins of the Dura Mater, bring back the Blood which they receive from the Arteries. Of these Veins, some running obliquely from the forepart of the Brain backwards, and others contrary, from the hind-part forward. creep a little space between the Duplicature of the Membrane, as the Ureters do upon the Bladder, and so they open in the Sinus. In this Sinus there are feveral small Cells and round Ligaments. which go from one fide of the Cavity to the other. These, by their Elasticity, further the Motion of the Blood.

The Second and Third Sinus's, which Laterales. this Sinus pours into, are the Laterales; they rife from the end of the first, into which they open, and going down upon the fides of the Occipital Bone, in a crooked way, they pass through the fame hole with the Eighth Pair of Nerves, and discharge themselves into the internal Jugulars. Into thefe Sinus's some Veins and the other Sinus's discharge themselves.

The

Of the Fourth Sinus.

The Fourth Sinus runs by the broad Extremity of the Falx, and opens where the Lateral Sinus's join the Longitudinal. This meeting of the four Sinus's is call'd Torenlar. It receives the Blood at its other Extremity from the Plexus Choroides.

Of the Sinus Superiores.

Besides these, there are Six more, which have been describ'd by several Anatomists. The first two are call'd Superiores, they rife from the hinder Processes of the Sella Turcica, or from the Circular Sinus's of Dr. Ridley, and run along the upper part of the Internal Processes of the Os Petrosum; then descending, they open into the Laterales.

of the Interiores.

There are two more call'd Inferiores; they rife from the same place with the other two, and running upon the Union of the Os Petrofum with the Occipital. they open into the Laterales, just as they are going out of the Skull-

There is a Fifth, which the curious A FifthSinus. Monf. Du Verney demonstrates; it runs upon the third Process of the Dura Mater, and divides into two branches. of which one opens into the Laterales, and the other into the Sinus Vertebrales. of the Circu-That exact Anatomist Doctor Ridley,

lar Sinus.

in his Treatife of the Brain, gives account of a Sixth, which he calls the Circular Sinus, because it surrounds

the

the Glandula Pituitaria; it communicates with the two Superiores and

Inferiores.

Vefalius hath remark'd a Sinus which of three other runs along the bottom of the Falx, and Sinus's. which opens into the Fourth Sinus; this is call'd, by Monf. Du Verney, Longitudinalis Inferior. There are two more fituated at the second Process of the Dura Mater, one on each fide; they are about an Inch wide from the Laterales, into which they open; but thefe three do not always appear.

The Use of these Sinus's is to receive The Use of the the Blood of the adjacent Parts from the Sinus's. Veins, to which they are as fo many Trunks which discharge the Blood into

the Internal Jugulars.

The Vessels of the Dura Mater are, of the Vessels first, a Branch from the Carotidal, whilst Mater. it is in its long Canal, which is dispersed in the fore and lower part of the Dura Mater. Secondly, An Artery which enters the hole of the Cranium, call'd Foramen Arteria Dura Matris; it is dispersed on the sides of this Membrane, and runs as high as the Sinus Longitudinalis. The Vein which accompanies the Branches of this Artery goes out of the Skull by the Foramen Lacerum. Thirdly, a Branch of the Vertebral Artery and Vein which passes through that Hole where the Lateral Sinus's Marrow

Sims's join the Jugulars; they are dispers'd in the hind part of the Dura Mater.

The Blood which is brought by the Arteries, is carry'd back by the Veins which go out at the fame holes by which the Arteries enter: but in cafe the swelling of the Arteries, by a Preternatural Fermentation of the Blood, should compress the Veins as they go out of the Skull; which might eafily happen, being it has more Arteries than Veins : therefore there are feveral other Veins, which inosculate with the Arteries, and which carry the Blood from them into two small Veins, which are on the fides of the Longitudinal Sinus's; tis these Veins which open into this Sinus, that the Blood which was stopt the other way, may have a free Circulation this way, as has been ingeniously observed by Dr. Ridley.

It hath also Nerves from the first Branch of the Fifth Pair, which give it an Exquisite Sense. It has a motion of Sistole and Diastole, which is caused by the Arteries which enter the Skull. No doubt, the great number of Arteries in the Brain, contribute more to it, than those sew proper to it self, which may assist a little, though not very sensibly, because of their smallness and paucity. The Use of the Dura Mater, is to contain and cover the Brain, the Spinal Marrow.

Marrow, and all the Nerves, to divide the Cerebrum in two, and to hinder it

from pressing the Cerebellum.

The Pia Mater is a thin and delicate of the Pia double Membrane which lies under the Mater.

Dura Mater, and covers immediately the Substance of the Brain. Its inner Membrane is much larger than its outer Membrane, for it runs in betwixt all the Foldings and Circumvolutions of the Brain, to separate them, and to sustain the Blood-Vessels, which make several turnings and windings upon it, before they terminate in the Substance of the Brain. It has the same Use as the Dura Mater.

SECT. III.

Of the Cerebrum and Cerebellum.

THE whole Substance of the Brain The Brain disciplination is divided into two parts; that wided into two parts; that wided into two parts; that wided into two which lies mostly in the forepart of the Skull is properly call'd the Cerebrum; and that which lies in the back part, under the hind-part of the Cerebrum (which is supported by the second Process of the Dura Mater) is call'd the Cerebellum. Both the one and the other are contained in the Meninges and in the Cranium, as in a case of Bones, that nothing may hurt their Substance, which is soft.

Of the Figure of the Cerebrum.

The Cerebrum is of a round Figure ; and Substance it is divided by the first Process of the Dura Mater into the right and left fide. Its External Surface resembles the turnings and windings of the Intestines. In the Cerebrum we distinguish two different Substances, the External, which is of an Ashy colour, and the Internal, which is of a White colour. Its External Substance is call'd Substantia Corticalis, or Cineritia; it is foft, glandulous, and of the colour of Ashes. Its Internal, call'd Substantia Medullaris, is firmer, white, and fibrous; of it the Nerves are made, and it reaches to the Extremity of the Medulla Spinalis, where it divides into Fibres.

The External Substance of the Brain, by its Circumvolutions, resembles the Small Guts; and in the middle of each Circumvolution is the beginning of the Medullary Substance: so that the Cortical Substance is always on the External fide: And the Inner Lamina of the Pia Mater is co-extended with the Cortical Substance, which it immediately

covers every where.

Malpighius, who has examin'd this Cortical Substance, fays, that it is nothing but a heap of little Oval Glands, which receive the Capillary branches of the Veins and Arteries which belong to the Brain, and which send out an infi-

nite

nite number of Fibres, which all together make up the Medullary Substance, which going out of the Cranium, forms the Nerves and Medulla Spinalis contained in the Vertebra.

The Internal Substance of the right A general and left side of the Brain coming to join Structure of one another, leave a space between them the Brain.

which forms the three Ventricles, or Centrum Ovale; the Upper part or Covering of this space, is call'd the Corpus Callosum; the bottom of this space is the Internal Substance of the two fides of the Cerebrum, gathered together, as it were, in two bundles, which are call'd Crura Medulla Oblongata upon them are the Protuberances call'd the Corpora Striata, and the Thalami Nervorum Opticorum. These Crura uniting, make one Body call'd the Medulla Oblongata, upon which there are tour Prominences call'd Nates and Testes: And behind these Prominences, the Internal or Medullary Substance of the Cerebellum being also divided into two bundles, forms upon each fide of the Medulla Oblongata three more Protuberances, and then it passes out of the Cranium into the Vertebra, where it gets the name of Medulla Spinalis. This is a general Idea of the Structure of the Brain, for the better understanding its Parts: Which

Which we shall now describe in particular.

Below the depth of all the Circumvolutions of the Brain, the first thing that appears immediately under the first Process of the Dura Mater is the Corpus Callofum, or the Covering of the two Lateral Ventricles, formed by the Union of the Medullary Fibres of each fide.

Of the two Ventricles.

This being laid aside, the two Lateral Ventricles appear, they reach from the torepart of the Cerebrum backwards; they are pretty broad in their hindpart, but they grow narrower towards their fore-part. They are divided into the Right and Left Ventricle by a thin transparent Membrane, which comes from the under fide of the Corpus Callosum, and is extended to the Fornix. which is in the bottom of the Ventricles; of the Septum this Membrane is call'd Septum Linidum. I am apt to think it is a Production of the Pia Mater, which covers all the

Medium.

In these two Ventricles there are four Prominences, two in each Ventricle. Of the Corpo- The foremost two are call'd Corpora Striata, which are the tips of the Crura Medulla Oblongata. They are oblong, and their Extremities come down upon the fides of the two other Prominences; they are of a cineritious colour without, but in their internal

fides of the Ventricles.

ra Striata.

Sub-

Substance there are many white streaks. which are the Medullary Substance mixed with the cineritious or glandulous. They are, as it were, tied together by a Medullary Process, call'd, (by Vicustius) Commissura Crassionis

Nervi Amula

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The two other Prominences are call'd of the Thal, Thalami Nenvorum Opticorum, because Nerv. Optic. the Optick Nerves rife out of them; they are Medullary without, but a little cineritious within; they are of an oblong Figure; they are upon the upper part of the Crura Medulla Oblongata: between them there is a Medullary Tract, which encompasses them, call'd (by Willis) Limbi Posteriores Corporum Striatorum. Upon them also lies the Plexus Cho of the Plexus roides, made of Veins, Arteries, and Choroides. little Glands The learned Dr. Ridley fays, he has feen Lymphaticks rife from it. This Plexus reaches from one Lateral Ventricle to the other, passing under the Fornix, above the third Ventricle It fends a Branch to the fourth Sinus of the Dura Mater.

In the middle, above the Corpora Stri- of the Fornix. ata and the Th. Nerv. Opt; there lies a thin and broad Production of the Medullary Substance, which comes from the fore-part of the Ventricles by two Roots, and reaches to the hinder-part. where it ends by two other Protube-

rances

rances call'd its Crura, which cover agreat part of the Thal, Nerv. Optic. This Production is call'd the Fornix, because it is a Covering to the third Ventricle.

Of the third Ventricle.

dibulum.

Under the Fornix there is a Rima between the Crura Medulla Oblongata. which is the third Ventricle, it being a little dilated in its fore-part : There is a Hole that goes down to the Glandula Pituitaria; this Hole is the entry to the of the Infundibulum or Funnel, so call'd because of as Figure. It is a small Conduit made of the Medullary Substance, covered with the Pia Mater; it pierces the Dura Mater upon the basis of the Skull, and finks into the Sub-Stance of

dula Pituita. ria.

of the Glan. The Glandula Pituitaria, which is fituated in the Sella Turcica, closely cover'd with the Pia and Dura Mater; it is of a harder Substance than the other Glands of the Body; it receives the end of the Infundibulum, which carries a Liquor from the Ventricles into this Gland, which is furrounded by the Rete Mirabile or a Plexus of some Branches of the Carotidale and Cervical Arteries. which break the impetus of the Blood. and abate the Velocity, as it passes through the tender Substance of the Brain as baid so of applicate but about where if ends by two other Protube-

Of the Rete Mirabile.

rxoces

But to return to the third Ventricle, of the Anus, In its hinder part there is another small Hole called Anus, which leads into the fourth Ventricle in the Cerebellum. In the upper part of this Hole is fituated the Glandula Pinealis, (Des Cartes's Glandula Pipretended Seat of the Soul) about the bigness of a Pease; it is composed of the fame Substance with the rest of the Brain, and for the same Use. It is tied

by fome Fibres to the

Nates, which are two Prominences of Nates. the Medulla Oblongata, fituated above the fore-part of that Conduit, which leads from the Anus to the fourth Ventricle; they are of an Oval figure, pretty big, and immediately behind them are two other Prominences of the fame figure and substance, call'd Testes, both Testes. cover'd with a Net of Blood-Veffels. There is a small transverse Medullary Protuberance behind the Testes, from

which the Pathetick Nerves rife.

The Conduit which reaches from the 18thmus. Anus to the fourth Ventricle, is in that part of the Medalla Oblongata, which is betwixt the Cerebrum and the Cerebellum, call'd the Isthmus. The upper part or Cover of this Conduit, which is betwixt the Teftes and the toremost Vermicular Process of the Cerebellum, to which two it is tied at its two ends. and to the Processes that come from the

H Cerebel-

lor.

Cerebellum to the Testes, at its sides, is Valvula Ma- call'd Valvula Major: 'Tis of a Medullary Substance; its Use is to keep the Lympha from falling out above the Nerves in the basis of the Skull. These are all the Parts belonging to the Cerebrum.

Cerebellum.

Now the Cerebellum, which is much less, is also composed of a Cortical and Medullary Substance; its Superficies makes not turnings and windings as that of the Cerebrum; but its foldings are straight, and they resemble the Segments of Circles, or the edges of Plates laid on one another; and these Segments are largest in its middle, and they grow less as they approach its fore and hind-part, where they feem to refemble two Worms, therefore call'd Processus Vermiformes.

Proceffus Vermifor-

The Medullary Substance of the Cerebellum, as it approaches the Medulla Oblangata, gathers together, and then divides equally into two bundles, which are joined to the two fides of the Medulla Oblongata: As they separate, they leave a little space upon the upper side of the Medulla, which is call'd the of the Fourth Fourth Ventricle; and its further end, because of its resemblance, Calamus Scriptorius. The top of this Ventricle is covered with feveral Blood-Vessels woven like a Net.

Ventricle.

The

The Medullary Substance of the Ce- of the Process rebellum makes three Processes upon rebellum. each fide of the Medulla Oblongata. The first two go on each side of it to the Testes; the Valvula Major is betwixt The second two are pretty broad; they go straight down on each fide, and meet on the under fide of the Medulla; they make that Protuberance call'd Processus Annularis; and Processus Anthe third goes backwards upon the upper nularis. fides of the Medulla; they make it look bigger, being like two Cords upon its

fides.

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This is all that is remarkable in the Cerebrum, Cerebellum, and upperfide of the Medulla Oblongata. But if you turn over the Brain, you may see distinctly the rise of all the Nerves, the Infundibulum, two white Spots behind it, the Crura Medulla Oblongata, one on each fide of the Cerebrum. Where they join, you may fee the Processus Annularis, or Pons Varolij: And beyond that, there two Prominences call'd Cor- Corpora Pypora Pyramidalia; they are about an ramidalia and Olivaria. Inch long; and on each fide of them, towards their lower end, there are two more, which, because of their figure, are call'd Corpora Olivaria; and then the Medulla Oblong at a goes out of the Skull, being contained in the Pia and Dura Mater.

Observe, That the Medulla Obsongata, with all the Protuberances which are upon its upper and lower sides, are not purely of the Medullary Substance, but internally they are mix'd with the Cortical; and it is this mixture which makes that they call Striae, to which they have given different imaginary Uses, according to their different Positions.

Now the Vessels of the Brain are Nerves, Veins and Arteries. The Nerves are Ten Pair. The First Pair are the Olfactory Nerves; they rife from the basis of the Corpora Striata, and pass through the Holes of the Os Cribriforme. The Second Pair are the Optick Nerves; they rife partly from the Extremities of the Corpora Striata, and partly from the Thalami Nervorum Opticorum, which they almost embrace; they unite together above the Cella Turcica, and immediately dividing again, they pals through the two foremost Holes in the Os Sphanoides. The Third Pair are Movers of the Eves; they rife on each fide of the Infundibulum from the Medulla Oblongata, and go out at the Foramina Lacera. The Fourth Pair are the Pathetick Nerves; they rife from the small Medullary Cord which is behind the Testes. and pass through the Foramina Lacera. The Fifth Pair rife from the fore-part of the Processus Annularis; they give Nerves

Nerves to the Dura Mater; each of them divides into three branches, the first passes out at the Foramen Lacerum. the fecond at the third Hole of the Os Sphoenoides, and the third through another Hole of the same Bone. The Sixth Pair rifes from the fides of the Processus Annularis, and goes out at the Foramen Lacerum; but just before it goes out, it casts back a Branch which makes the Root of the Intercostal Nerve; this goes out at the Canal through which the Carotidale Artery enters. The Seventh is the Auditory Nerve; it rifes from the hind part of the Processus Annularis, and enters the Hole in the Process of the Os Petrofum. The Eighth Pair is the Par Vagum, it rifes from the Medulla Oblongata behind the Processus Annularis, by several Threads which join in one, and it goes out at the same hole the Lateral Sinus's open into the Jugulares. The Ninth Pair rifes from the Processus Olivares of the Medulla Oblongata, and passes out at a hole in the Occipital Bone, which is proper to its felf. The Tenth and last Pair rises by several Fibres from the beginning of the Medulla Spinalis; from thence ascending within the Occiput, it turns, and passes out at the same hole through which the Vertebral Artery enters, between the First Vertebra and the Occi-H 3 . pital

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pital Bone, running through a Sinus in this Vertebra. These are the Nerves of the Brain, which we shall trace further in the Eighth Chapter.

of the Veffels

The Arteries are the two Internal Carotidals which pass through two oblique Canals in the Offa Petrofa: As foon as they enter the Skull, they give a branch which enters the Orbit of the Eye; they give branches which make the Rete Mirabile, then they pierce the Dura Mater on each fide of the Infundibulum; they communicate with the Cervical Artery, and they give Branches to the Plexus Choroides, and are distributed through all the Substance of the Brain: Their Branches make many turnings and windings upon the Pia Mater, and at last are lost in the little Glands of the Cortical Substance of the Brain.

The two Vertebral Arteries which come out of the holes in the transverse Processes of the Vertebra, enter the large hole of the Occipital Bone; they pierce the Dura Mater, and go along the under side of the Medulla Oblongata; then they cast back two Branches for the Spinal Arteries, and at the Processus Annularis they join in one branch call'd the Cervical Artery. This communicates with the two Carotides, by two Branches call'd the Communicant Branches;

Branches; then it divides again into two, which give Branches to the Rete Mirabile, Plexus Choroides, and they are afterwards distributed through all the Substance of the Brain, ending in the Cineritious Substance, as the Carotidales.

The Veins enter not the Cranium at the same holes that the Arteries do, because, as Dr. Ridley rightly observes, upon any Fermentation of the Blood, the Swelling and Pulse of the Arteries would compress the Veins against the bony fides of their Paffage, and fo cause a Stagnation and Extravalation of the Blood in the Brain, which would be the destruction of the whole Machine. Neither do the Veins run along by the fides of the Arteries in the Brain, as they do through all the rest of the Body, but they rife from the Extremities of the Arteries, in the Cineritious Substance of the Brain, and go straight to discharge themselves into the Sinus's of

The Blood which is brought into the The Use of the Brain by the Carotidal and Vertebral Brain. Arteries, is separated by the Glands, which make the Cineritious and Cortical Substance of the Brain, from its finest and most subtile Parts, call'd Animal Spirits, which are received from the Glands by the Fibres of the Medul-

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lary.

lary Substance, which is the beginning of the Nerves. Each Nerve therefore is a bundle of very fine and small Tubes, of which some are no bigger than part of an Hair; and these Tubes are the Excretory Ducts of the Cineritious or Glandulous part of the Brain. This does not only appear from the Structure of the Brain, but by reason likewise we are assured that there is such a Fluid as we call Animal Spirits running in the Nerves. For feeing all Senfation is performed by the Nerves, it must be done either by the Substance of the Nerve, or the Fluid which is contained in the Nerve: If by the Substance of the Nerve, it must be by a Vibration from the Part upon which the impresfion is made to the Brain. Now that there can be no Vibration from the impression of external Objects upon Animal Nerves, which are flack, and furrounded all along by other bodies, is evident; and therefore Sensation must be performed by the Fluid in the Nerves.

The Motion of this Fluid is not swift and rapid, as is generally supposed, but flow and languid, seeing all its motion proceeds from the dilatation of the Arteries compressing the soft Substance of the Nerves, and from the force by which it is thrust through the Glands of the Brain. And when the Nerves are full Objects may be communicated to the Brain without any quick motion in the Animal Spirits, either by retarding or stopping their progressive Motion, or by causing an Undulation. If to these we add, that the Animal Spirits must be confined within their own proper Chanels, as well as the other Fluids of the Body; we shall easily perceive how precarious the many ingenious Hypotheses are, which the Learned Willis has elegantly describ'd in his System of the Nerves, and Nervens Distempers.

SECT. IV. Of the Eyes.

THE Organs of Sight are divided into two Parts: The Internal Part, which is the Globe or Body of the Eye; and the External Part, which is those Parts about the Globe subservient to the Globe.

The first of these last are the Eye-of the Eye. brows, which are nothing but some brows. Hairs bunching out above the Eye, by some Fat which is under the Skin in this place. They break the Rays of Light, that they be not directly darted into the Eyes, which would greatly offend the

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Sight, as they do when we look directly

upon the Sun.

The Eye-lids. The next are the Eye-lids, two to each Eye. The Upper Lid moves very quickly, the Under very undifcernibly.

Its Mufcles. The Upper Eye-lid is lifted up by the Musculus Rectus, which rises from the bottom of the Orbit of the Eye, where the Optick Nerves pierce the Cranium, and passing above the Musculus Superbus, 'tis inserted by a large Tendon

to the border of the Eve-lid.

Both Lids are brought together to thut upon the Eye by another Muscle call'd Orbicularis. It rifes from the great Angle of the Eye, and its Fibres are spread two fingers breadth, covering the Under Lid; they reach to the Little Canthus, from which continuing its Circular Fibres which cover the Upper Lid, it is inferted into the fame place from which it arole. Some Authors divide this Muscle into two, the Superiour and Inferiour, which they make to rife from the great Canthus, and to be inserted into the little Canthus.

Of the Conjunctive.

The Eye-lids are covered within with a smooth Membrane call'd Conjunctiva, because it is continued upon the forepart of the Globe, constituting that which we call the White of the Eye; it joins the Globe to the edges of the Orbit.

The

The Edges of the Eye-lids have two of the Cilia fmall and foft Cartilages, like the Segments of a Circle, call'd Cilia; they keep the Eye-lids extended, that every Part may be equally raised. Upon them there is a rank of small Glands, whose Excretory Chanels open upon the Edges of the Lids. They yield a Wax which fasteneth the Eye-lids together whilst we fleep. They are cover'd with the Skin externally, and with the Conjunctiva internally. Upon the Edges of the Lids there are also some Hairs in form of a Pallifado, to preserve the Eyes, as the Eye brows do, and to hinder any Filth or Flyes from falling into the Eyes.

In the backfide of the Conjunctiva, of the Glaupon the upper part of the Globe, is dula Lachrymalis, pretty large, malis. divided into feveral Lobes, each of which fends out an Excretory Chanel which opens in the forefide of this Membrane, where it covers the Upper Lid. This Gland separates the Matter of the Tears, which, by the continual motion of this Lid, moisten the Cornea, which otherwise would dry and wrinkle by the continual action of the external Air.

The Edges of the Eye-lids being of an equal convexity with the Ball of the Eye, which they touch, as the Tears fall from off the Cornea, they are stopt by the Edge of the Under Eye-lid, along

which

Puncta Lachrymalia.

which they run, till they fall into two small holes in the great Canthus of the Eve. one in each Eve-lid. These Holes are call'd Puncta Lachrymalia, they lead to a small membranous Bag, which is fituated in this corner, upon the Os Lachrymale; from the bottom of which there goes a small Pipe, which pierces this Bone into the Nose. and opens under the upper Lamina of the Os Spongiosum. It moistens the inner Membrane of the Nostrils, by the humour of the Lachrymal Gland, which runs from off the Globe into them. Sometimes the acrimony of this Humour causeth Sneezing, which we hinder, by pressing the Angle of the Eye, and so ftop its running.

Between these two Puneta there is a Caruncle which serves to keep them open when the Eyes are shut: This Caruncle was thought to be the Glandula La-

chrymalis.

the Musiles the Eye.

four straight Muscles, and two oblique; and betwixt them there is a great deal of Fat, which facilitates the motion of the Globe.

The first of the four straight Muscles is call'd Attollens, or Superbus; it lies upon the upper part of the Globe; it pulleth up the Eye when we look up. The second is call'd Deprimens, or Hu-

milis :

milis; it pulleth down the Eye. The third is call'd Adductor, it draweth the Eve towards the Nose. The fourth Abductor, it draweth the Eve towards the little Canthus. They rife all four from the Circumference of the Hole in the Orbit, through which the Optick Nerves pass, and they terminate about the Cornea by four pretty large Tendons. When they all act together, they draw the Eye towards the bottom of the Orbit. When the Superbus and the Adductor, or the Abductor, act together, or the Humilis and the Adductor or Abductor act together, they perform the Oblique Motions, which have been attributed to the Oblique Muscles.

The first of the Oblique Muscles, which is the fifth of the Eye, is the Obliquus Minor; it rises from the lower side of the Orbit near its External Circumference, where the first and second Bones of the Upper Jaw join together, and ascending obliquely by the outer Corner of the Eye, 'tis inserted to the upper and external side of the Globe, behind the Tendon of the Abdustor.

The fecond of the Oblique Muscles, and the fixth of the Eye, is the Obliques Major; it rises from the bottom of the Orbit, and marching obliquely towards the great Canthus, in the upper part of which, near the brink, there is a Cartila-

ginous

ginous Ring, through which it passes its round Tendon; from whence reverting backwards, it's inferted into the upper part of the Globe, behind the Tendon

of the Attollens.

The Use of the first of these Muscles is to draw the Globe of the Eye forwards, and to turn its Pupil upwards; and of the second, to draw it forwards, and to turn its Pupil downwards, for the better receiving of the Rays of Light, which could not be performed by any of the other four Muscles, (as Mr. Cooper has very well observed.) And both of them are an Axis for suspending the Globe; by which, in its almost continual motion, 'tis' moved the more eafily, (as has been ingeniously observ'd by Monf. de la Hire. -

Now the Globe of the Eye is of a Sphærical figure; in it are contained the principal Instruments of Vision; 'tis

composed of Coats and Humours.

Of the Conjunctiva.

The first Coat is the Conjunctiva; it makes the White of the Eye; it hath been already described: It is full of small Veins and Arteries, which appear big in an Ophthalmia or Inflammation of the

Eyes.

Sclerotica.

The fecond is call'd Sclerotica; 'tis thick, hard, and fmooth, opake behind, but transparent before, where it makes the

Third

Third Coat call'd Cornea, because it is Cornea. transparent, like the Horn of a Lantern, in the forepart of the Eye, which is furrounded by the White of the Eve: It has a greater Convexity than the rest of the Globe of the Eye, and is compos'd of several parallel Lamina, which are nourished by many Blood-Vessels. fo fine, as not to hinder even the smallest Rays of Light from entring the Eye; and it has a most Exquisite Sense, that, upon the least Pain, the Tears might be squeez'd out of the Lachrymal Gland, to wash off any filth which, by sticking to the Cornea, might render it opake.

The fourth is the Choroides; it lies Choroides. under the Sclerotica; 'tis much thinner than it: It hath a great number of Blood-Vessels which come from the fecond, and which are spread upon it; as also several Glands, which separate from the Blood-Vessels a black Liquor which tinctures all this Membrane internally, which is otherwise of a whitish colour. This Coat is open, or has a hole before, for the passage of the Rays of Light, call'd Pupilla. That part of this Coat which makes the Circumference of this Hole, and which lies upon the fides of the Chrystalline Humour, is

The fifth Coat call'd Quea, which is uves. made of circular and straight Fibres;

Tris.

it contracts and dilates according to the different impressions of Light and of

Obiects.

The Iris is the outside of the Uves. where the different Colours appear. On the infide of the Ovea, from its Circumference, which joins the Choroides, rifes the Ligamentum Ciliare. It is made of short Fibres which run upon the forepart of the Glassy Humour to the edges of the Chrystalline, like Lines drawn from the Circumference to the Centre. By the contraction of these Fibres the forepart of the Eye is made more prominent, and the Retina pressed further back from the Chrystalline Humour, or the Axis of Vision is lengthened when Objects are placed too near the Eye.

The fixth is the Retina, so call'd, because it resembles a Net, which covereth the bottom of the Cavity of the Eye: It is a fine expansion of the Medullary Fibres of the Optick Nerve upon the furface of the glaffy Humour, as far as the Ligamenta Ciliaria: 'Tis on this Coat that the impressions of Objects are

made.

Of the Aque-

Retina.

The Humours of the Eve are three: ous Humour. The first is call'd the Aqueous; it lies in the forepart of the Globe, immediately under the Cornea; this Humour is thin and liquid, of a spirituous Nature, for it will not freeze in the greatest Frost.

This evinces the necessity of a continual supply for this Humour, which, in effect, it hath: For if the Cornea be prick'd, and this Humour squeez'd out, it shall be restor'd again in the space of ten or twelve Hours.

The second Humour is the Chrystal- chrystalline; it lies immediately next to the Harmour-Aqueous, behind the Uvea, opposite to the Pupilla, nearer to the forepart than the backpart of the Globe; it is the least of the Humours, but much more solid than any of them: Its Figure, which is Convex on both sides, resembles two unequal Segments of Spheres, of which the most Convex is its backside, which makes a small Cavity in the Glassy Humour in which it lies.: It is cover'd with a fine Coat call'd Aranea.

The third is the Glassy Humour; it of the Virtual hath a great resemblance to the White Humour. of an Egg; it filleth all the hind-part of the Cavity of the Globe. It is in a greater abundance than the other two. It is thicker than the Aqueous, but thinner than the Chrystalline Humour. It is contained in a very fine Coat of the same Name. It gives the Spherical Figure to the Eye. Upon its back-part the Retina is spread, which it holdeth from the Chrystalline Humour at a distance requisite to receive the impression of Objects distinctly.

The

The Optick Nerves pierce the Globe of the Eye a little on the infide of the Optick Axes. Their External Coat, which is a production of the Dura Mater, is continued to the Sclerotis, as their Internal from the Pia Mater is to the Choroides; and their Medullary Fibres paffing through all, are expanded into the Retina, upon which the Images of Objects are painted. The Centre of this Expansion is insensible, and all Rays which fall upon it are loft, and confequently, that point of the Object from which these Rays come is invifible to that Eye, as is evident from that famed Experiment of Monsieur The reason of this Insen-Mariotes. fibility proceeds probably from the Blood-Veffels which enter with the Optick Nerve, and cover this part of the Retina. But whatsoever its Cause is. we are extremely obliged to the Maker of our Eyes, that the Optick Nerves are inferted on the infide of the Optick Axes; for if they had pierced the Globe of the Eye in the Optick Axes, then the middle point of every Object had been invisible; and where all things conduce to make us see best, there we had not seen at all. We must likewise have lost some part of an Object, if the Optick Nerves had been placed on the Outfide of the Optick Axes: because an Object

Object may be so placed, as that all the Rays which come from one point may fall upon the outfide of both Eves; but it is impossible that they should fall upon the Infide of both Eyes, and therefore that point which is loft in one

Eye, is visible by the other.

The Vessels of the Eyes are Branches of the Vessels of the External Carotides and Jugulars of the Eyes. which are distributed upon the External Parts of the Eyes, and a Vein which opens into the Superiour Sinus of the Dura Mater, in the basis of the Skull, and an Artery from the Internal Carotidale. They accompany the Optick Nerves, and are distributed on the Muscles and Globe of the Eye.

There are also some Lymphaticks which accompany the Blood-Veffels.

The Nerves of the Eyes are

The Optick Nerves; they are pretty of their big and round. The third Pair, of the Nerves. Brain, call'd Motorij; The fourth Pair, call'd Pathetici; The first branch of the fifth Pair, call'd Ophthalmicus; and the fixth Pair; are all bestowed upon the Muscles of the Eyes.

All the Rays which come from one of Vilian. point of an Object, are, by the Cornea and Humours of the Eye, united in a point of the Retina, which is in a straight Line, drawn from the fame Point of the Object, through the Centre

of the Eye; and consequently all the Rays, which come from all the Points of an Object, are united on the Retina, in the same order and proportion as the Points of the Object are from whence these Rays come. Therefore the impression which these Rays make upon the Retina, must be the Image of the Object.

Thus, in General, Vision is performed. But now let us see what the several Parts of the Globe conduce in this Action. We have said, that the Cornea was more Convex than any other part of the Globe; by which means, all the Rays are gathered to pass through the Pupilla, and none of them are lost upon.

the Uvea.

How the Parts
of the Eye
contribute to

The Aqueous Humour being the thinnest and most liquid, easily changes its figure, when either the Ligamentum Ciliare contracts, or both the Oblique Muscles squeeze the middle of the Bulb of the Eye, to render it oblong when

Objects are too near us.

The straight Fibres of the *Uvea* dilate the *Pupitla*; when there are but few Rays of Light; and the Circular Fibres contract it, when they are too many. When the *Pupilla* is contracted, we see most distinctly; when it is dilated, we see most clearly. The Glassy Humour keeps the Chrystalline Humour at such

fuch a distance from the Retina, as is necessary for uniting the Rays which come from one Point of the Object, exactly in one Point of the Retina.

The impression of the Object is made upon the Retina. The Choroides is tinctured black, that the Rays of Light which pass through the Retina, may not be reflected back again, to confuse the

Image of the Object.

Being distinct, Vision confists in the union of all the Rays which come from one Point of an Object exactly in one Point of the Retina; and that the Rays which come from Objects at different distances, are united at different distances, behind the Chrystalline Humour: They cannot both be united exactly upon the Retina; therefore the Eye cannot see equally distinctly at the same time Objects at different distances. It is for this reason that the Globe of the Eye moves so quickly, and almost continually, and that the Muscles of the Eyes have such a great quantity of Nerves to perform their motion.

When the Globe of the Eye is flat, as happens sometimes in Old Age, that the Rays pass the Retina before they unite, in such a case there is no distinst Vision; and such as have this defect, are call'd Presbite. And if, on the contrary, the Globe of the Eye be so

Convex

Convex as to unite the Rays before they come to the Retina, neither is there then any diffinct Vision, and such as have this defect are call'd Myopes.

SECT. V.

Of the Exter-

THE Ear is divided into the External and Internal. The External Ear (whose Parts have already been described) is composed of the Skin, a Cartilage, and a little Fat. The Skin of this Part is thin and smooth, it slicks close to the Cartilage by means of a sine Membrane. The Cartilage is in that part of the External Ear call'd the Pinna; and the Fat, in that part call'd the Lobe. The Vessels of the External Ear, are Arteries from the Cartidale Veins which go to the Jugulares, and Nerves from the Portio Dura, and second Pair of the Neck.

The External Ear is tied to the Os Petrosum by a strong Ligament which comes from the backside of the Pinna. Though the Ear has but a very obscure motion, yet it has two Muscles: The first arises from the outside of the Frontal Muscle, where it joins the Crotaphite, and is inserted into the upper and backpart of the Pinna. The second arises

from

from the upper and foremost part of the Processus Mammillaris, and is inserted into the middle and back-part of the Concha. The first should draw the Ear upwards, and the fecond downwards and backwards; but the continual binding of our Ears when young, deprives us of their Use. The Use of the External Ear is to gather the Sounds, and to carry them to the Internal. Its Inequalities and Circles do moderate the

violence of the Air.

The Internal Ear begins at the Con- of the Meatus duit which goes from the middle of the Auditorius, Concha to the Tympanum; it is call'd Meatus Auditorius. It is Cartilaginous from the Concha till within a little of the Tympanum, where it is Bony; yet this Cartilage goes not compleatly round, for towards the Temple its edges do not meet by above a Line. The Passage is crooked, running first upwards, and then downwards to the Tympanum. It is cover'd within by a pretty thick Membrane. Betwixt this Membrane and the Cartilage, especially where it is flit, there are a great number of little Glands, whose Excretory Chanels piercing this Membrane, carry a vellow fort of Excrement into the Meatus, which hinders Infects or any other thing to enter the Ear.

Of the Tym-

At the further Extremity of this Conduit there is a thin transparent Membrane stretched out like the Head of a Drum, upon a bony Circle which wants about half a Line of being compleat. The Handle of the Malleolus is tied to this Membrane, which it draws somewhat inwards, making it a little Concave towards the Meatus Auditorius: And there runs a small twig of a Nerve from the fifth Pair upon its inside, call'd Chorda Tympani; for the Membrane it sell is call'd Tympanum.

Of the Barrel

Behind this Membrane there is a pretry large Cavity call'd the Barrel; it is about three or four Lines deep, and five or fix wide. It is lined with a fine Membrane, on which there are feveral Veins and Arteries. It is always full of a purulent Matter in Children. In this Cavity there are four small Bones, of which,

of the Malleolus.

The first is the Malleolus or Hammer, so call'd, because of its shape. Its Head has on its lower side two Protuberances and a Cavity whereby its joined to the Incus by Ginglymus: Its Handle, which is pretty long and sinall, is fastened to the Tympanum. Near its Head it has two small Processes, and it is moved by three Muscles.

Its Mufeles.

The first is call'd the Externus; it arises from the upper and External side

of the Meatus Auditorius, and is inferted into the upper and longer Process of the Malleolus, which it draws outwards. This is necessary, when Sounds are too great, which might break the Tympanum.

The second is the Obliques; it lies in the external part of the Conduit which goes to the Palate, and entring the Barrel, it is contained in a Sinuosity of the Bone by the upper edge of the Tympanum, and is inserted into the slender Process of the Hammer, assisting the former Muscle in its Action.

The third is the Internus, which arises from the extremity of the bony part of the Conduit which leads to the Fauces, and lies in a Sinus of the Os Petrosum, till it passes over a little rising of the Bone at the Fenestra Ovalis, to be inserted into the posterior part of the Handle of the Malleolus. This Muscle, by pulling the Hammer inwards, diftends the Tympanum.

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de of The second small Bone is call'd Incus, of the Incus. the Anvils It has a Head, and two Legs. Its Head has a Protuberance, and two Cavities, whereby it is articulate with the Hammer; the shorter of its Legs is tied to the side of that Conduit which goes to the Processus Mammillaris, and its longer Leg to the Head of the third Bone, call'd and the side of the Head of the third Bone, call'd and the side of the Head of the third Bone, call'd and the side of the side of the third Bone, call'd and the side of t

The Stapes or Stirrop, because of its of the Stapes.

resemblance. Tis of a triangular figure, being made of two branches set upon a state basis, which stands upon the Foramen Ovale. The space between the two branches is fill'd up by a fine transparent Membrane; the union of the two branches is call'd the Head of the Stirrop, in which there is a small Cavity, in which lies the tourth Bone. There is a small Muscle which arises out of a small Canal in the bottom of the Barrel, and which is inserted into the Head of the Stirrop.

of the Os The Os Orbiculare, which is a very crbiculare finall Bone, being Convex on that fide which is received in the Cavity of the Head of the Stirrop, and hollow on the other fide, where it receives the long Leg of the Anvil, which is only joined to the Stirrop by means of this fourth

Bone.

of the Holes inc. Besides these Bones, there are several the Barrel. Holes in the Barrel. The sirst is in its forepart nearest the Timpanum. It is the entry to the Sinns in the Mammillary Process. The second is the Orisice of a Conduit which opens behind the Palate of the Mouth. The beginning of this Conduit is bony; and its extremity, which is near the Uvula, is membranous. Part of the Air which we breath, enters by this Conduit into the Ear. The third and fourth are in the Internal Process

Process of the Os Petrosum. The one is call'd Fenestra Ovalis; the basis of the Stirrop stands upon it; it is the entry to the Vestibulum. The other is call'd Fenestra Rotunda; it is cover'd by a fine Membrane, inchafed in a rift of this Hole: It leads to the Cochlea.

The Vestibulum is a Cavity in the Os of the Vesti-Petrofum, behind the Fenestra Ovalis; bulum. it is cover'd with a fine Membrane: In it open the Semi-circular Pipes of the Labyrinth. The upper turning of the Cochlea, and the Auditory Nerve, pierces

into it alfo.

The Labyrinth is made of three Semi- of the Labycircular Pines excavated in the Os Perinth. trofum; they open by five Orifices into the Vestibulum. That which is call'd the Superiour Pipe, joins one of its Extremities with one of the Extremities of that which is call'd the Inferiour Pipe, and thefe two Extremities open by one Orifice, but the middle Pipe opens at each end by it lelf into the Vestibulum.

The last Cavity of the Ear is the of the Co-Cochlea; it refembles a Snail's Shell. Its chlea. Canal, which winds in a Spiral Line, is divided in two, the Upper and Lower, by a thin Lumina Spiralis. The edge of this Lamina is membranous, where there are several Holes, through which twigs of the Auditory Nerve pass from the one Canal to the other. The

Upper

Upper Canal opens into the Vestibulum, and the Lower into the Barrel, by the

Fenestra Rotunda.

of the Vessels of the Ear.

The Vessels of the Internal Ear are Arteries and Veins from the Internal Carodidale and Jugulars. The Nervus Auditorius enters by the Hole in the Internal Process of the Os Petrosum. It consists of two Bundles, of which one is hard, the other soft. Its Portio Mollis is distributed through all the Cochlea and Labyrinth, and the Portio Dura is bestowed on the External Parts about the Ear.

Of Hearing.

distracts

A Sound is nothing but a certain Refraction or Modulation of the External Air, which being gathered by the External Ear, passes through the Meatus Auditorius, and beats upon the Tympanum, which moves the four little Bones in the Barrel. In like manner as it is beat by the External Air, these little Bones move the Internal Air which is in the Barrel and Vestibulum: which Internal Air makes an impression upon the Auditory Nerve in the Labyrineh and Cochlea, accordingly as it is moved by the little Bones in the Barrel. So that, according to the various Refractions of the External Air, the Internal Air makes various impressions upon the Auditory Nerve, the immediate Organ of Hearing; these different Impressions represent different Sounds. lenel) soo

SECT.

SECT. VI.

Of the Nofe.

THE Nose may be divided into two Parts, the External and Internal. The External Part is covered with the Skin and some Muscles, of which afterwards. Its upper part confifts of two Bones closely joined together on their upper fide. Its lower part is made of tour Cartilages, of which the first two are fixed to the lower ends of the aforefaid Bones; they are also joined together on the upper fide; they are pretty broad, and as they approach the tip of the Nose, they grow thinner and softer. The other two lie upon the lower ends of the first two, to which they are tied by a Membrane; They are call'd Narium Ale.

The Cavity made by these Bones and four Cartilages, is divided in its middle into two Nostrils, by a Partition, of which the upper end is bony, the lower end Cartilaginous: The fleshy Extremity of this Cartilage is call'd Columna.

The upper end of each fide of this Cavity divides into two, of which one goes up to the Os Spongiofum, the other goes down into the Fauces, and opens behind the Palate, by which means we abmuoH

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breath through our Nostrils. At the lower end of this Cavity there are two small Holes which pierce the Bone of the Palate, and open in one behind the Dentes Incisivi; they carry the thin Rheum of the Nostrils into the Mouth.

This Cavity is cover'd by a pretty thick and glandulous Membrane; its Glands separate that Matter which we call Mucus into the Nostrils. On the lower end of this Membrane there grow feveral Hairs call'd Vibriffi; they, with the Mucus which the Glands separate, Rop any filth from ascending too far into the Nostrils.

CERTAIN.

By the Internal Part of the Nofe, we understand the immediate Organ of Smelling; it lies in the upper part of the Cavity of the Nostrils, it is made of the Os Cribriforme and its Productions, the Os Spongiofum, of which each Lamina is cover'd with a fine Membrane, upon which the Fibres of the Olfactory Nerve which pass through the Holes of the Os Crivriforme, and the Fibres of the first branch of the Fifth Pair, which come from the Orbit, are foread.

In this Membrane there are many small Glands which separate an Humour which moistens it, and stops the Exhalations of odoriferous bodies, which make their impression upon the Olfactory Nerves which are spread upon it.

Hounds

Hounds and other Beafts which have a more exquisite Smell than Men, have also many more Lamina cover'd with such a Membrane.

There are feveral Conduits which of the Con open between these Lamina. The first duits which and second are the Ductus Lachrymales, Nofe. of which we have spoken before. The third and fourth come from the Sinus Frontales. The fifth and fixth come from the Sinus's of the lecond Bone of the Upper Jaw. The feventh and eighth come from the Cells of the Os Spongiosum, they pierce the Membrane which covers the first or uppermost Lamina: And the ninth and tenth come from the Sinus in the Os Sphoenoides. All these Conduits carry the Liquor which is separate in their Cavities into the Nostrils, for the moistening its Membranes, which otherwise would dry too much by the Air which we breath through our Nostrils.

The Vessels of the Nose are Arteries of the Vessels from the Carotidals which pass with of the Nose. the Olfactory Nerve, they are distributed in the Internal Nose: The External Carotidal and Jugular, and the second branch of the Fifth Pair, give Arteries, Veins and Nerves to the External Nose. Some give an account why the imell of Bodies, which consist of acrimonious Parts, draw Tears from I 4 the

Of the Mouth and Tonque.

the Eyes; and why the want of Tafte does ordinarily accompany the want of Smelling, by the communication of the branches of the Fifth Pair of Nerves, which are distributed through these three Senses.

SECT. VII.

Of the Mouth and Tongue.

THE Parts of the Mouth, are the Lips, the Gums, the Palate, the Toula, and the furrounding Glands.

Of the Lips and Gums.

The Lips are made up of several Muscles, of which afterwards. Their Use is to shut the Mouth, and to articulate the Voice.

The Gums are a hard fort of Flesh formed by the union of two Membranes, one of which is a Production of the Periosteum, and the other of the Internal Membrane of the Mouth: I hey are set about the Teeth, to keep them firm in their Sockets.

of the Palate. The Palate or Roof of the Mouth is covered with a pretty thick Membrane, which is continued to the Tonfils; upon it there are a great number of little Glands, whose Excretory Ducts piercing it like a Sieve, discharge a Liquor tor the moistening and dissolving of the Aliments. It is an Errour, to think

think that the Palate Taftes; for by it it's impossible to distinguish the most acrid Substances, to approve and maintain

The Uvula is a Reduplicature or Pro- of the Uvula duction of the Internal Membrane of and its Mufthe Mouth; its Substance is very lax, cles. and it has a number of small Glands as in the Palate: It is somewhat long, of a Conick figure, it hangs from the Roof of the Mouth, at the extremity of the Paffage which comes from the Nofe,

above the Larynx, between the Tonfils. It is moved by two Pair of Muscles,

which are.

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The Pterigostaphilinus Externus; it ariles fleshy from a small Protuberance. upon the under fide of the Body of the Os Sphænoides, and goes directly to be inferted into the hind part of the Uvulan W nel work shi the tensor bas

The Prerigostaphilinus Internus arises. from the fame Protuberance of the Os Sphenoides; and growing into a small round Tendon, which passes over a small Process, like a Hook, of the Processus Prerigoideus; from thence reverting it's inferted into the forepart of the Vvula. mit ods as au asgo redresor fisod

When the first of these Muscles acteth. it pulleth the Uvula bickwards; when the fecond contracterh, it pulleth the Vunta forwards, because of the Pulley. through which its Tendon paffes, which

alters the direction of its Motion; both which Motions are necessary for the articulating the Voice, and in Deglutition, that nothing may regurgitate into the Nose which we take by the Mouth west some

Of the Parozides.

The Glands, which are the Sourfes of the Spittle, which discharges it felf into the Mouth, are in great number. of which the principal are the Parotides, one on each side, situated under the Ear, above the Musculus Masseter; they are of the Conglomerate fort, being made up of a great number of smaller Glands, each of which fends out a finall Excretory Duct, and they all unite and form one Chanel call'd Ductus Salivalis Superior, which running over the Cheeks, pierces the Buccinator, and opens in the Mouth. When the Masseter acteth in Mastication, it presses the Saliva into the Month

of the Maxil- The Maxillares, which are fituated within the Under Jaw, one in each fide, are also of the Conglomerate fort; the Excretory Pipes of their fmall Glands unite, and form two Ducts, which both together open under the tip of the Tongue, on the infide of the Dentes Incifivi, when they have each a small Papilla at their Orifice. When the Muscles of the Tongue or Lower Jaw act, they compress these Glands, distorting

The

Papiese or

DAG IDEEMS.

The Sublinguales are one on each fide Of the Subof the Tongue; they have fometimes linguales, two Excretory Ducts, as the former, formed by the union of that of each finall Gland; they run on each fide of the Tongue, near its tip, where they open into the Mouth, just by the former, with which fometimes they join : Sometimes thefe are wanting, and then each little Gland has a Duct which opens under and sing the Tongue : When the Mylohyoidaus acteth, it compresses them:

The Tonfilla, or Almonds, are two of the Tonround Glands placed on the fides of the fills. balis of the Tongue, under the common Membrane of the Fauces, with which they are cover'd; each of them hath a large oval Sinus, which opens into the Fances, and in it there are a great number of leffer ones, which discharge themfelves through the great Sinus, of a mucous and flippery Matter, into the Fances, Larynce, and Oefophagus, for the moistening and lubricating thefe Parts. When the Muscle Oesophagens acteth, it compresseth the Tonfille.

Befides thefe, there are a great number of little Glands spread upon the Cheeks and Lips, call'd Glandule Baccales and Labiales, whose Excretory Chanels open into the Mouth; and all of them feparate the Saliva or Spirtle, which conduces in the diffolution of the Aliments.

The Tongue is connected in the Mouth to the Os Hyoides, to the Larynx, and by a membranous Ligament which is in the middle of its lower fide. Sometimes this Ligament is continued to the tip of the Tongue. and then it hindereth Children from Sucking : therefore in fuch a case it should be cut.

branes and Papillæ of the Tongue.

Of the Mem- The Tongue is covered with two Membranes. The External hath upon its upper part, and particularly towards the tip of the Tongue, a great number of Papilla, of a Pyramidal figure; they stand not up straight, but encline towards the basis of the Tongue; they appear not so plainly in Men as in Brutes, in some of which last they grow Carrilaginous. Each Papilla has a small root, which makes a small hole in the viscous Substance, which lies between the two Membranes. In Men, the chief Use of these Papilla Pyramidales seems to be for preserving the Papilla Nervosa, which are of a fofter Substance, that they be not hurr by the hardness or roughness of the Aliments: And in Beafts which feed upon Grass, which they gather together with their Tongue, these Papilla are like so many Hooks, for the grasping, cutting, and pulling of the Grass; and perhaps, by their roughnels rubbing upon the Palate, they conduce

duce to press the Spittle out of the Glands. Towards the basis of the Tongue are to be seen several small Glands like those of the Cheeks.

Under the External Membrane there lies a thin viscous Substance, which is white on that side next the External Membrane, and black on that side next the Internal. When the Tongue is boiled, this Substance hardens, and is like a Searce, being full of small holes made by the roots of the Papilla Pyramidales.

The Internal Membrane is thin and fost; upon it there appear several Papilla made of the Extremities of the Nerves of the Tongue, therefore they are called Nervosa: They are fituated upon the fides of the Tongue, but chiefly towards its tip; they resemble the small Horns of a Snail; for their Extremities are round, and bigger than the rest of their Bodies. The Extremity of each Papille pierces the External Membrane of the Tongue. They quit those Holes, and remain on the Internal Membrane, when the External is raised. These Papilla are the immediate Organ of Tasting.

The Substance of the Tongue is muf of its Subculous, being made of Plans of Fibres stance.

of different Directions.

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The first or External Plan is made of straight Fibres, which furround the Tongue, reaching from its Basis to its Point: When they contract, they shorten the Tongue. Under them there are feveral Plans of Fibres, which run from one edge of the Tongue to the other; they draw the edges of the Tongue together. There are also several Plans of Fibres, which run from the under to the upper fide of the Tongue: When they contract, they make the Tongue broad and thin. These two forts of Fibres lie Stratum Stratum, from the tip of the Tongue to its basis; first a Plan of one fort, and then a Plan of the other fort. There is fome Fat betwixt thefe Fibres, but chiefly towards the basis of the Tongue.

Its Veffels.

The Vessels of the Tongue are Veins from the Jugulars, call'd Ranulares: It has Arteries from the Carotidals. and Nerves from the Fifth and Ninth

ales.

of its Muf. The Muscles of the Tongue are Three Pair.

> The Stylogloss; it arises fleshy from the Processus Styloides, from thence defcending, it is inferted into the Root of the Tongue : It draws the Tongue up

The second Pair is the Geniogloss; it arises from the inside of the forepart of the Lower Jaw, and is inserted into the Root of the Tongue; it pulls the

Tongue out of the Mouth.

The third is the Ceratogloss; it arises broad and fleshy from the sides of the Os Hyoides, and is inserted into the Root of the Tongue; it pulls the Tongue directly into the Mouth. The Fibres of this Muscle which are nearest the Extremities of the Os Hyoides, were only call'd the Ceratogloss, and those which were nearest the basis of the Os Hyoides were call'd the Basingloss: But I see no reason to distinguish them, being they he in the same Plan, and their Fibres have the same Direction, Origination, and Insertion.

The Tongue is not only moved by of the Os these Muscles, but also by a Bone call'd Hyoides.

Os Hyoides. Now this Bone lies at the Root of the Tongue: Its Figure is

like the Greek letter v; it is composed ordinarily of three Bones, that in the middle makes its basis, it is shorter than the other two; it is Convex without, but Concave within; the other two are joined to its two ends by two intervening Cartilages, they are much longer than the first; they have each

a Cartilage at their Extremities, and they are call'd the Cornua, or Horns.

The

Of the Mouth and Tongue.

The Basis of this Bone is joined to the Root of the Tongue, and its Horns are joined to the upper Angles of the Cartilago Thyroides, and by two small and round Ligaments to the Processus Styloides of each fide. This Bone is moved, and with it the Tongue, by five Pair of Mufcles. your happing er box 23 Nove 1

of its Muscles. The first is the Geniohyoidans; it arises fleshy from the forepart of the Lower-Jaw internally, and is inserted into the Basis of the Os Hyoides. It pulls the Os Hyoides and the Tongue upwards and forwards.

Its Antagonist is the Sternohyoidans; it arises from the inside of the Clavicula, and ascending above the Sternothyroidaus, it's inferted into the Basis of the Os Hyoidaus, which it pulls downwards

The third is the Mylohyoidens; it ariseth fleshy from the infide of the Lower law, under the Dentes Molanes, and is implanted into the fides of the Basis of the Os Hyoides: It draweth this Bone and Tongue obliquely upwards, severe of it is Convex. shraw

Its Antagonist is the Coacchyoidens; it is wrong named, for it arises not from the Proceffus Coracoides, but from the upper edge of the Scapula, near its Neck and afcending obliquely under the Mastoidans, it is inserted into the

Os Hy-

Os Hyoides, which it pulls obliquely downwards. The Belly of this Muscle is a little tendinous in its middle, that the Vessels which go to the Head be not compressed when it acteth.

The fifth Pair is the Stylohyoidaus; it arises from the Processus Styloides, and descending obliquely, is inserted into the Horns of the Os Hyoides, which it draws to one side, and a little upwards.

The Belly of this Muscle is perforated for the passage of the Tendon in the middle of the Digastricus.

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CHAP. V. Of the BONES.

BECT. I.S. A. Warts

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Of the Bones in general.

Hough after the Description of the three Cavities it is usual to give the Myology; yet because it cannot be understood without a perfect Knowledge of the Bones, therefore we shall begin with them.

Of the Nourishment of the Bones. The Bones are made up of hard Fibres, tied to one another by small transverse Fibres, as those of the Muscles are. In a Fætus those Fibres are porous, soft, and easily discerned. It is probable that they are nourished by the Serous or Lymphatick part of the Blood, which is brought to them by the Arteries, and carried back by the Veins. As their Pores fill with a Substance of their own Nature, such as we suppose the Lympha to be, so they encrease, harden, and grow close to one another: but when their Pores are full of this Substance.

stance, then the Bones are grown to their utmost extent, hardness, and solidity, their Blood-Vessels being compressed on all sides by their bony Chanels, bring no more Blood than what is sufficient to supply the places of their decaying Particles.

All the Bones of the Body which have of the We of any confiderable thickness, have either a the Marrow.

large Cavity, or they are Spongeous, and full of little Cells: In both the one and the other there is an Oleaginous Substance call'd Marrow, contained in proper Vesicles or Membranes, like the Fat. In the larger Bones, this fine Oil, by the gentle heat of the Body, is exhaled through the Pores of its small Bladders, and enters some narrow Pasfages which lead to fome fine Chanels excavated in the Substance of the Bone. according to its length; and from thele, other cross Passages (not directly oppofire to the former, left they should weaken the Bone too much in one place) carry the Marrow still further into more Longitudinal Chanels placed nearer the Surface of the Bone. All this Contrivance is, that the Marrow may fupple the Fibres of the Bones, and render them less apt to break.

All the Bones of the Body, except the Teeth, and where the Bones are articulate to one another, are cover'd with a

espances

thin, but close and strong Membrane call'd Periosteum; it has an Exquisite Sense, which gives me ground to think that it is an Expansion of some of the tendinous Fibres of the Muscles. Its Use is to sustain the Vessels, which enter the Substance of the Bones with their Nourishment.

Each large Bone is much bigger at its extremities than in the middle, that the Articulations might be firm, and the Bones not eafily put out of Joint: But because the middle of the Bone should be frong, to sustain the weight of the Body, and refift blows and falls, therefore the Fibres there are closely compacted together, supporting one another; and the Bone is made hollow, and consequently not so easily broken as it must have been had it been solid and smaller: For of two Bones of equal length and equal numbers of Fibres, the strength of the one will be to the strength of the other as their Diameters.

of the Cavi. On the external Surface of the Bones ties and Pro-there are several Cavities and Protube-tuberances of rances. The Cavities are of two sorts, either narrow and shallow, or wide and deep. The first sort is call'd Glene; the second Cotyle. But in describing the Bones in particular, we shall also describe their Cavities. The Protu-

berances

berances are also of two forts, viz. Apophysis and Epiphysis. The Apophysis is a Protuberance made by the Fibres of the Bone; and Epiphysis is a Protuberance made by a small Bone set upon the extremity of a bigger Bone, which, as we advance in Age, unite in one. Both the one and the other are ordinarily upon the extremities of the Bones, and they are either tor the Infertions of Muscles, whose force they greatly augment, or for the Articulation of the Bones. All their difference is from their Figure. If it be a large and round Protuberance, it is call'd Caput; and the Part immediately under it, Cervix: but if it be small and round, then it is called Condylus. If it be a sharp Protuberance, then it is call'd Corone, Styloides, Coracoides, &c. according to its Figure.

In the Bones there is much Volatile Analysis of Salt and Spirit, which are very subtile the Bones. and penetrating; some Sulphur, which is very stinking, a little Phlegm, and

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Property and a Maria SECT.

SECT. H. T. T.

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Of the Cartilages and Ligaments in general.

A Cartilage is a smooth and folid Body, softer than a Bone, but harder than a Ligament. In it there are no Cavities nor Cells for containing of Marrow, nor is it covered with any Membrane to make it sensible, as the Bones are. The Cartilages have all a natural refort, by which, if they are forced from their Natural figure or fituation, they return to it of themfelves, as foon as the force is taken away. They are chiefly in those places where a small and easie motion is required, as in the Ears, Nofe, Larynx, Trachea Arteria and Sternum; and their Natural Elasticity serves instead of Antagonist Muscles. They cover also the ends of all the Bones, which are joined together for motion. First, Because they are smoother than the Bones. Secondly, Because they are without Sense. And, Thirdly, Being fofter than the Bones, the Attrition which is made by the motion of the Joint, is the more eafily Jupplied.

A Ligament is a white and folid Body, foster than a Cartilage, but harder

than

than a Membrane; they have no confpicuous Caviries, neither have they any Sense; lest they should always suffer upon the motion of the Joint. Their chief Use is to fasten the Bones, which are articulated for motion together, lest they should be dislocated in any violent motion.

SECT. III.

Of the Articulation of the Bones.

THE Bones are articulated or joined of the Joining to one another, either with a ma-of the Bones. nifest motion, or with a sinall and obficure motion, or without any motion

at all. The first sort of Articulation is call'd Diarthrosis: The second, because of the Cartilage by which it is performed, is call'd Synchondrosis: And the

last, Synarthrofis.

Of the Diarthrosis there are two sorts, viz. Enarthrosis or Arthrodia, and Ginglymus. The First is, when a round Head of a Bone is received into a round Cavity of another, such as the Articulation of the Femur with the Ishiam; and this fort of Joining is call'd, by Tradesmen, the Ball and Socket. The property of this Joining is, that the Parts so articulated move equally to any side. The Ginglymus is, when a Bone both receives

receives and is received; and the property of this fort of Articulation is to admit only of the motions of Flexion and Extension; It is called by Tradesmen Charnall, and it is commonly used in hinges. Of this Articulation there are three forts. The first is when the end of a Bone has two Protuberances and one Cavity, and the end of the Bone which is articulated with it has two Cavities and one Protuberance, as the Humerus and the Ulna. The second is, when a Bone at one extremity receives another Bone, and at its other extremity it is received by the fame Bone, as the Radius and Ulna. The third fort is, when a Bone at one end receives another Bone, and at the other end it is received by a third Bone, as the Vertebra do.

The Second fort of Articulation, which is call'd Synchondrosis, is when the Extremities of two Bones are joined to one another by means of an intervening Cartilage. Thus the Bodies of the Vertebra and the Extremities of the Ribs and Sternum, are joined together, where, though the motion of all is manifest, yet that of any two is hardly discernable.

The Third manner of Articulation, call'd Synarthrofis, is of two forts, viz. Sutura, and Gomphofis. The Sutura is,

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SECT. IV.

A second of the

Of the Bones of the Cranium.

THE Cranium or Skull is made up of several pieces, which being joined together, form a considerable Cavity, which contains the Brain, as in a Box.

The bigness of the Crasiam is proportionate to the bigness of the Brain. Its Figure is round, a little depressed on its fides. A round figure being the most capacious, was fittest to contain a great quantity of Brains. And the flatness of its fides help to enlarge the Sight and Hearing.

Each Bone in the Cranium is made up of two Tables or Lamina, between which there is a thin and spongious Substance, made of some bony Fibres which come from each Lamina, call'd in Greek Diplos, in Latin Meditullium.

In it there are a great number of Veins and Arteries, which bring Blood for the Nourishment of the Bones. The Tables are hard and solid, because in them the Fibres of the Bones are close to one another. The Diploe is soft, because the bony Fibres are at a greater distance from one another. By this Contrivance, the Cranium is not only made lighter, but also less subject to be broken.

The

The External Lamina is smooth, and covered with the Pericranium. The Internal is likewise smooth; but on it there are several furrows made by the pulse of the Arteries of the Dura Mater, whilft the Cranium was foft and yielding.

The Bones of the Cranium are joined to one another by four Sutures. The

Coronalis. Lambdoida lis, Sagittamola.

of the Sutura first is call'd the Coronalis. It reaches trafverfly from one Temple to the other; it joins the Os Frontis with the lis, and Squa-Offa Parietalia. The second is call'd Lambdoidalis, because it resembles the Greek letter (A) Lambda; it joins the Os Occipitis to the Offa Parietalia and Petrofa. The third is call d Sagittalis; it begins at the top of the Lambdoidalis, and runs straight to the middle of the Coronalis; it joins the two Offa Parietalia together. The fourth is call'd Sutura Squamosu, because the Parts of these Bones which are joined by this Suture, are, as it were, cut flope-wife, and lapp'd over one another.

This Suture joins the Semicircular Circumference of the Offa Temporum to the Os Sphænoides Occipitis, and to the Offa Parietalia. The first three Sutures were call'd Suture Vera; and the last Satura Falsa, because it was supposed to have no Indentations, which is

false.

The Bones of the Cranium are not of the Surura only joined to one another, but they Transvers lis, are also joined to the Bones of the and Sphoenoi-Upper Jaw by three other Sutures. dalis. The first is the Transversalis, it runs across the Face, it passes from the little Angle of the Eye down to the botrom of the Orbit, and up again by the great Angle of the Eye over the Root of the Nose; and so to the little Angle of the other Eve. It joins the Os Frontis to the Bones of the Upper law. The second is the Ethmoidalis, it surrounds the Bone of that Name, and joins it to the Bones which are about it. The third is the Sutura Sphoenoidalis, it furrounds the Os Sphænoides, joins it to the Os Occipitis, the Offa Petrofa, and to the Os Frontis.

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The Cranium is made of several pieces joined together by Sutures, that it might be the stronger, and less apt to break, that several Membranes and Vessels which suspend the Dura Mater, and which go to the Pericranium, may pass through the Sutures, and that the Matter of Transpiration may pass through them.

Now the Bones of the Cranium are of the Bones fix Proper, and two Common to it and of the Skull. the Upper Jaw. The fix Proper are, the Os Frontis, which makes the forepart of the Skull; the Os Occipitis,

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which

which makes the hind-part; and the Osa Parietalia and Temporum, which make the sides. The two Common are, the Sphænoides and the Os Ethmoides, which are part of the basis of the Skull.

Os Frontis.

The first of the Proper, is the Os Frontis or Coronale; it is almost round; it joins the Bones of the Sinciput and Temples by the Coronal Suture, and the Bones of the Upper Jaw by the Sutura Transversalis, and the Os Sphoenoides by the Sutura Sphænoidalis. It forms the upper part of the Orbit, and it has four Apophyles, which are at the four Angles of the two Orbits. It has two Holes above the Orbits, through which pass a Vein, Artery, and some twigs of the first branch of the fifth Pair of Nerves. It has also one in each Orbit a little above the Os Planum, through which a twig of the Ophthalmick branch of the fifth Pair passes to the Nofe; it is the Orbiter Internus. It has two Sinus's above the Eye-brows, between its two Tables; they are lined with a thin Membrane, in which there are several Blood-Vessels and Glands, which separate a mucous Serosity, which falls into the Noffrils. The infide of this Bone has feveral Inequalities, made by the Vessels of the Dura Mater. It has two large dimples made by the anterior anterior Lobes of the Brain. Above the Crista Galli it has a small blind Hole, into which the end of the Sinus Longitudinalis is inserted. From this Hole it has a pretty large Spine which runs up along its middle; instead of this Spine, there is sometimes a Sinus, in which lies the Sinus Longitudinalis, which ought to be observed carefully by Surgeons in Wounds in this place. This Bone is thicker than the Sinciput Bones, but thinner than the Os Occipitis. In Children it is always divided in its middle by a true Suture.

The second and third are the Bones of Parie-

of the Sinciput call'd Parietalia; they talia. are the thinnest Bones of the Cranium; they are almost square, somewhat long; they are joined to the Os Frontis by the Sutura Coronalis, to one another in the Crown of the Head by the Satura Sagittalis, to the Os Occipitis by the Lambdoidalis, and to the Offa Temporum by the Sutura Squamofa. They are smooth and equal on their outside, but on their infide they have feveral furrows, made by the Pulse of the Arteries of the Dura Mater. They have each a small Hole near the Sutura Sagittalis, through which there pass some Veins which carry the Blood from the Teguments to the Sinus Longitudinalis.

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Of the Bones of the Cranium.

200 Offa Tempo-

The fitth and fixth are the Offa Temporum, fituated in the lower part of the fides of the Cranium; their upper part. which is thin, confifting only of one Table, is of a circular figure, and is joined to the Offa Parietalia by the Sutura Squamofa: Their lower part, which is thick, hard, and unequal, is joined to the Os Occipitis and to the Os Sphænoides; this Part is call'd Os Petrosum; they have each three External Apophyles or Processes, and one Internal. The first of the External is the Processus Zygomaticus, which runs forewards and unites with the Process of the Os Mali, making that Bridge called the Zygoma, under which lies the Tendon of the Crotaphite Muscle. The fecond is the Mammillaris, or Mastoideus; it is short and thick, situated behind the Meatus Auditorius. The third is the Processus Styliformis, which is long and small; to it the Horns of the Os Hoides are tied. The Internal Process is pretty long and big in the basis of the Skull, it contains all the Cavities and little Bones of the Ear, which have been already described. The Holes in the Temporal Bones are two Internal, and four External. The first of the Internal, is the Hole through which the Auditory Nerve passes; the fecond is common to it and the Os Occipitis ; SEL

cipitis; the Eighth Pair of Nerves, and the Lateral Sinus's pass through it. The first of the External Holes is the Meatus Auditorius Externus. The fecond opens behind the Palate; it is the end of that Paffage which comes from the Barrel of the Ear to the Mouth. The third is the Orifice of the Conduit by which the Carotidale Arteries enter the Cranium: And the fourth is behind the Processus Mastoideus; by it passes a Vein which carries the Blood from the External Teguments to the Lateral Signs's. Sometimes this Hole is wanting; there is another which is between the Processus Mastoideus and the Styliformis, through which the Portio Dura of the Auditory Nerve paffes. They have each a Sinus lined with a Cartilage under the Meatus Auditorius, which receives the Condyle of the Lower law.

The fixth Bone of the Cranium is Os Occipies, the Os Occipies, it lies in the hind-part of the Head; it is almost like a Lozenge with its lower Angle turned inwards; it joins the Ossa Parietalia and Petrosa by the Satura Lambdoidalis, and the Ossa Sphænoides by the Sphænoidalis. It is thicker than any of the other Bones of the Cranium, yet it is very thin where the Splenius, Complexus and Trapezius are inserted. Externally it is rough; internally it has two Sinus's, in K. 4 which

which lie the two Protuberances of the Cerebellum, and two large furrows in which lie the Sinus Laterales. has seven Holes: the first two are common to it and the Offa Petrofa; the Lateral Sinus's, and the Par Vagum, pass through them. The third is the great Hole through which the Medulla Spinalis passes. The fourth and fifth are the Holes through which the ninth Pair of Nerves passes. The fixth and seventh are two Holes through which there pass two Veins which bring the Blood from the External Teguments to the Sinus Laterales; fometimes there is but one, and fometimes none of these two; there are fometimes two more through which the Vertebral Veins pass. This Bone has also two Apophyjes, one on each side of the great Hole; they are lined with a Cartilage, and articulated with the first Vertebra of the Neck. It has also a Protuberance in its middle, from which there goes a small Ligament which is inferred into the first Vertebra of the Neck. It is longer in Beasts than in Men.

Os Sphæ-

The first of the Bones common to the Skull and Upper Jaw, is the Sphoenoides. It is a Bone of a very irregular figure. It is fituated in the middle of the basis of the Skull. It is joined to all the Bones of the Cranium by the Sutura

Sutura Sphonoidalis, except in the middle of its fides, where it is continued to the Offa Petrofa as they were one Bone. On its outlide it has five Apophyles. The first two are broad and thin like a Bat's Wings, they are called Pterigoides; they have each a pretty long Sinns, from which the Muscles call'd Pterigoidai arile; and at their lower end they have each a finall Hook like a Process, upon which the Peri-Staphilinus Externus turns its Tendon. The third and fourth make the Internal and lower part of the Orbit; and the fifth is a little Apophyse like the Crista Galli in its forepart, which is received in a Cavity at the further end of the Vomer. There is also a little small Protuberance in the middle of this Bone, from which the Muscles of the Vunla arise. On its infide it has four Processes call'd Clinoides, they form a Cavity in the middle of this Bone call'd Cella Turcica, in which lies the Glandula Pituitaria. Betwixt the two Tables of this Bone. under the Cella Turcica, there is a Sinus, divided in two in its middle, which opens by two Holes into the Cavity of the Nostrils. In the Os Sphænoides there are twelve Holes; by the first and fecond pass the Optick Nerves; by the third and fourth, which are call'd Foramina Lacera, pass the third Pair, fourth Pair.

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Pair, first branch of the fifth Pair, and the fixth Pair; by the fifth and fixth pass the second branch of the fifth Pair; by the seventh and eighth pass the third branch of the same Pair; by the ninth and tenth enter the Arteries of the Dura Mater; and by the eleventh and twelfth enter the Internal Carotidales, and the Intercostal Nerve goes out. The Canal by which the Carotidales enter are oblique, the beginning of them is made in the Osa Petrosa, and they open within the Skull in the Sphænoides.

os Ethmoï-

The fecond and last of the common Bones is the Os Ethmoides; fituated in the middle of the basis of the Os Frontis, joined to that Bone and to the Os Sphoenoides by the Sutura Ethmoidalis. In its middle it has a small Process called Crista Galli, to which the fore end of the Falx is tied. This Bone is perforated by a number of small Holes, through which the Fibres of the Olfactory Nerve pass, therefore it is also call'd Os Cribriforme. From its under side there goes a thin Bone, which divides the Cavity of the Nostrils in two; the lower edge of this Bone is Groved with the Vomer. On each fide of this Partition it has several thin spongious Lamina, call'd Offa Spongiola; they are full of little Cells, where they are joined to the Ethmoides.

Ethmoides. There are two Lamine which neither adhere to the Os Ethmoides, nor to the other Lamina, but only by the Membrane which covers them all. The two External Lamine of the Offa Spongiofa make part of the Orbit at the great Canthus, and they are call'd Osla Plana, because they are smooth and even. water on the college and bus lowed

SECT. V. O will sale

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Of the Bones of the Upper Tan.

HE Bones of the Upper Jaw are two Common to it and the Skull. which have been already described; and eleven Proper, that is, five in each fide, and one in the middle; they are joined to the Bones of the Skull by the three Common Sutures, and joined to one another by a fine but true Suture.

The First of the Proper Bones is the Os Mali Os Mali or Zygoma; it is of a triangular figure. Its upper fide makes the lower and external part of the circumference of the Orbit, where it joins the Os Sphænoides. Its Internal fide joins the Os Maxillare. Its External has a long Process, which joining that of the Offa Temporum, forms the Procesus Zygomaticus; it joins the Os Frontis at the little Angle of the Eye. It is Concave

Concave within, and it sticks out a little forwards, making the highest part

of the Cheek.

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Os Maxillare. The Second is the Os Maximum or Maxillare, because in it all the Teeth of the Upper Jaw are fet. It is of a very irregular figure. On its outfide it joins the Os Mali. Its upper fide makes the lower and Internal part or circumference of the Orbit. At its great Canthus it joins the Os Unguis and Frontis. The lower side of the Os Nasi is joined to it. Under the Upper Lip it joins with its fellow of the other fide, and both joined together make the fore and greatest part of the Roof of the Mouth. It is very thin, and between its two Lamina it has a large Cavity which opens by a small Hole into the Nostrils. In its lower end it has fixteen Sinus's or Sockets, in which the Teeth are fet. It has a small Hole called Orbiter Externus, in that part of it which makes part of the Orbit, through which the Nerves of the fifth Pair which come from the Teeth pass. Behind the Dentes Incifivi, where it joins with its fellow, it has another which comes from the Nostrils.

Os Unguis. The Third is the Os Unguis, it is a little thin Bone which lies in the great Angle of the Orbit, it has a Hole in which the Lachrymal Sack lies. I fee no reason why this Bone should be

counted

counted a Bone of the Upper Jaw, feeing it lies entirely in the great Angle of the Orbit; there is more reason to count it a Lamina of the Os Spongiofum, as the Os Planum.

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The Fourth is the Os Nas; this is a Os Nas. thin but folid Bone, which makes the upper part of the Nose; its upper end is joined to the Os Frontis by the Sutura Transversalis: one of its sides joins its fellow, where they are supported by the Septum Narium. Its other fide joins the Os Maxillare. Upon its lowerend the Cartilages of the Nostrils are faftened. Externally it is smooth, but Internally it is rough.

The Fifth Bone of the Upper Jaw is Os Palani the Or Palati; it is a small Bone almost fquare, it makes the posterior part of the Roof of the Mouth. It is joined to that part of the Os Maxillare which makes the forepart of the Palate. It is also joined to its fellow, and to the Precessus Pterigoidans. It has a small Hole through which a branch of the fifth goes 5; to the Membrane of the Palate. of new

The Eleventh and last is call'd the Vomer. Vomer, it is fituated in the middle of the lower part of the Nofe. It has a cleft in its upper side, in which cleft it receives the lower edge of the Septum Nafi. In its further end it receives a small Apophy/e

Apophyse of the Os Sphænoides, and its

under fide joins the Os Palati.

By what has been faid, you see, that the Bones of the Skull and Upper Jaw compose the Orbit of the Eye. The upper part of it is made of the Os Frontis; the Os Unguis and Os Planum make the inner and lower part of the great Angle; and the Os Sphænoides the inner and lower of the little Angle. The Os Maxillare makes the inner and lower part of the Circumference, and the Os Mali the outer and lower

part.

Let us now briefly recapitulate all the Holes in the Head. They are either External or Internal. The External Holes are, 1. The two in the Coronal Bone above the Orbit, through which a Vein, Artery and a Nerve from the Ophthalmick branch of the fifth Pair pafferfor the brow and frontal Muscles: this frequently appears only as a Notch. 2. The Orbiter Internus in the same Bone within the Orbit, a little above the Os Planum, for another branch of the fifth Pair of Nerves which goes to the Nose. 3. Is between the Os Unguis and the Os Maxillare, in the great Canthus, through which the Ductus Lachrymalis passes to the Nose. 4. Orbiter Externus in the Os Maxillare below the

the Orbit, through which the Nerves and Vessels which come from the Teeth pass to the Cheek. 5. One single Hole in the fame Bone behind the fore Teeth, which comes from the Note. 6. Two in the Osa Palati, through which a branch of the fifth Pair of Nerves passes to the Palate, Vulla and Gums. 7. In the Temporal Bone between the Processus Mastoidens and Styliformis, through which the Portio Dura of the Auditory Nerve passes. 8. The Ductus Auditorius Externus. 9. The Ductus Auditorius Internus. 10. The Conduit for the Carotidale Artery. 11. In the same Bone through which a Vein passes from the External Teguments to the Lateral Sinus's; this is behind the Processus Mastoideus. 12. In the Occipital Bone behind its Apophyses, through which the Vertebral Veins pass. 13. In the same Bone for a branch of the External Jugular. 14. One fingle large Hole for the Medulla Spinalis.

The Internal Holes are, 1. The blind Hole above the Crista Galli. 2. The Holes in the Os Ethmoïdes. 3. In the Os Sphænoïdes for the Optick Nerves. 4. The Foramen Lacerum, through which the third, fourth, first branch of the fifth and fixth Pair of Nerves pass. 5. For the second branch of the fifth Pair of Nerves. 6. For the third branch of the

fame

same Nerve. 7. The Foramen Arteria dura Matris. 8. The Canal through which the Carotidale enters, and the Intercostal passes out, but this we counted amongst the External holes. 9. In the Process of the Os Temporum through which the Auditory Nerve paffes. 10. Between the Temporal and Occipital Bones, it is divided in two by the Dura Mater, through the one Part passes the eighth Pair of Nerves and the Nervus Accessorius; through the other, the Lateral Sinus's open into the Internal lugulars. 11. One in each fide of the large hole of the Occiput, through which the ninth Pair of Nerves goes out.

SECT. VI. Of the Lower Jaw.

THE Lower Jaw is made of one Bone whose Fibres at the Chin, in Children do not ossiste till they are about two Years old. It is composed of two Tables, which are pretty hard and smooth; but betwixt these two Lamina it is porous and sull of little Cavities; its figure resembles the letter v; at each Extremity it has two Processes, the uppermost is called Corone; it is thin and broad at its beginning, but

but it ends in a sharp Point, which passing under the Processus Zygomaticus, has the Tendon of the Crotaphite Muscle inferted into it. The other which is shorter and lower has a round Head, lined with a Cartilage, which is articulated into the Sinus of the Os Petrofum; but betwixt the Cartilage which lines the Sinus, and that which covers the Head of this Process there is a third, which adheres to the Ligamentum Annulare which furrounds this Articulation. The Motion of the Jaw fideways, which is absolutely necessary in chewing, is much facilitated by this loofe intervening Cartilage. The lower Edge of this Jaw is called its basis, each end of which is called the Angle of the Lower law.

The Lower Jaw has four holes, two on its inside near its Processes, and two on its outside near its middle. By the Internal holes enter a branch of the sistence of Nerves, an Artery from the Carotidales, a Vein passes out to the Jugulars, their branches are spread in the roots of the Teeth. By the External holes these same Vessels pass, and are distributed upon the Chin. It has also sixteen Sinus's into which the Teeth

are fet.

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SECT. VII.

Orthe Lance Ja

Of the Teeth.

Stance of the Teeth.

of the Sub. THE Teeth are the hardest and smoothest Bones of the Body; they are formed in the Cavities of the Jaws, which are lined with a thin Membrane, upon which there are feveral Vessels, through which there passes a thick, viscous, transparent Humour, which, as it encreases, hardens in the form of Teeth, which about the seventh or eighth Month after Birth, begin to pierce the edge of the law, tear the Periosteum and Gums, which being very sensible create a violent Pain and other Symptoms incident to Children in the time of Toothing.

> The Teeth begin not to appear all at one time; First the Dentes Incisivi of the Upper, and then those of the Lower Jaw appear, because they are the thinnest and sharpest. After them come out the Canini, because they are sharper than the Molares, but thicker than the Incifivi ; and last of all the Molares, because they are the thickest and bluntest. Of this viscous transparent Liquor, which is the Substance of the Teeth. there are two Lays, the one below the other, divided by the same Membrane, which

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which covers all the Cavity of the Jaw : The uppermost Lay forms the Teeth which come out first, but about the Seventh Year of Age they are thrust out by the Teeth made of the undermost Lay, which then begin to fprout; and if these Teeth be lost, they never grow again: but if some have been observed to shed their Teeth twice, they have had three Lays of this viscous Humour. About the One and twentieth Year the two last of the Molares spring up, and they are call'd Dentes Sapientia.

The Teeth, which are fometimes of the Dentes

fourteen, fometimes fifteen, and fome Incilivi. times fixteen in each Jaw, are of three forts, the Dentes Incifivi, Canini, and Molares. The Incisivi are the four foremost Teeth in each law, they are pretty broad, fharp at their ends, a little convex outwards, and hollow inwards in they have each a pretty long Root, which is a little crooked, and which grows small towards its extremity, that the pressure might not be all directly upon one point of the law, but fultained equally by every part which the sides of the Root touch.

The Canini are two in each law, one Canini. on each fide of the Incifivi; they are pretty thick and round, and they end in a sharp point; they have each one Root, which is longer than the Roots

of the Incisivi; their proper Use is to pierce the Aliments, because the Fore-Teeth are not only apt to be pulled outwards by the things we hold and break with them, but likewise because they are more subject to blows than the Molares, therefore above ; of them are contained in their Alveoli or Sockets, by which their resistance of all lateral pressures is much greater than that of the Molares.

Molares.

The Molares ordinarily are ten in each law; they are the thickest and biggest of the Teeth; their Extremities are broad and uneven; and because the pressure upon them is generally perpendicular, therefore they have fometimes two, fometimes three, and fometimes four Roots, which separate a little from one another, that having a broad bafis, they may find the greater refistance from the law when they press upon one another in chewing of the Aliments; and the pressure has the less force, seeing the Roots are a little crooked outwards. and not in a straight line under the pressure. The last of the Molares are the biggest and hardest, because we ordinarily thrust the hardest bodies farthest into our Mouth; they are nighest the Articulation, because their Use, which is to grind the Aliments small, require Ithe greatest strength. The have a little dimple in their Extremities, wherein they receive the Extremities of the two ascending oblique Processes of the Inseriour Vertebra; so that the two ascending Processes of each Vertebra of the Neck and Back are received, and the two descending do receive, except the first of the Neck, and last of the Back; but the ascending Processes of each Vertebra of the Loins receive, and the two descending are received contrary to those of the Neck and Back.

The Vertebra are all tied together by a hard Membrane made of strong and large Fibres; it covers the Body of all the Vertebra forwards, reaching from the sirst of the Neck to the Os Sacrum: There is another Membrane which lines the Canal, made by the large Hole of each Vertebra, which also ties them all together. Besides, the Bodies of each Vertebra are tied to one another by the intervening Cartilages and the Tendons of the Muscles, which are inserted in their Processes, tie them together behind.

This Structure of the Spine is the very best that can be contrived; for had it been all one Bone, we could have had no motion in our Backs: had it been of two or three Bones articulated for motion, the Medulla Spinalis must have been necessarily bruised at every Angle

or foint's besides, the whole would not have been so pliable for the several postures we have occasion to put our selves in. It it had been made of several Bones without intervening Cartilages, we should have had no more Use of it, than if it had been but one Bone. If each Vertebra had had its own distinct Cartilages, it might have been easily dislocated. And, lastly, The Oblique Processes of each Superiour and Interiour Vertebra keep the Middle one that it can neither be thrust backwards nor forwards to compress the Medulla Spinalis.

Thus much of the Vertebra in general; but because they are not all alike, we shall therefore descend to a more

particular Examination.

Of the Vertebræ of the Nock:

The seven Vertebra of the Neck differ from the rest in this, that they are smaller and harder. Secondly, That their stransverse Processes are perforated for the passage of the Vertebral Vessels. Thirdly, That their acute Processes are forked and straight; but besides this, the first and second have something peculiar to themselves.

Atlas.

The First, which is called Aslas, is tied to the Head, and moves with it upon the Second semi-circularly; its ascending oblique Processes receive the Tubercles of the Occiput, upon which

Articula-

Articulation the Head is only moved. forwards and backwards; and its descending Processes receive the ascending Processes of the second Vertebra. It has no acute Process, that it might not hurt the action of the Mulculi Recti; but a small Tubercle to which the small Ligament of the Head is inserted. In the forepart of its great Hole it has a pretty large Sinus, in which lies the Tooth-like Process of the second Vertebra, being tastened by a Ligament that rifes from each fide of the Sinus, that it compress not the Medulla Spinalis. It has two small Sinus's in its upper part, in which the tenth Pair of Nerves and the Vertebral Arteries lie.

The Second is call'd Epistrophans, or Vertebra Dentata, in the middle between its two oblique ascending Processes; it has a long and round Process like a Tooth which is received into the forefaid Sinus, upon it the Head with the first Vertebra turns half round as upon an Axis. The Extremity of this Process is knit to the Occiput by a small but strong Ligament, A Luxation of this Tooth is mortal, because it compresses

the Medulla Spinalis.

The Third Vertebra is called Axis; Axis. and the four following have no name, nor any peculiar difference.

Foiftro-

of the Verteoræ of the Back.

The Twelve Vertebra of the Back differ from the rest in this, that they are larger than those of the Neck, and smaller than those of the Loins; their acute Processes slope downwards upon one another: They have in each side of their Bodies a small dimple wherein they receive the round Extremities of the Ribs, and another in their transverse Processes which receives the little Tubercle near that Extremity of the Ribs. The Articulation of the twelsth with the first of the Loins is by Arthrodia, for both its ascending and descending oblique Processes are received.

of the Vertebrz of the Loins. The Five Vertebra of the Loins differ from the rest in this, that they are the broadest, and the last of them is the largest of all the Vertebra. Their acute Processes are broader, shorter, and wider from one another, their transverse longer, to support the Bowels, and the Muscles of the Back; they are not perforated as those of the Neck, nor have they a Dimple or Sinus as those of the Back. The Cartilages which are betwixt their Bodies are thicker than any of the rest.

of the Os Sa-

The Vertebra of the Os Sacrum grow fo close together in Adults, as that they make but one large and folid Bone of the figure of an Ifosceles triangle, whose Basis is tied to the last Vertebra of the Loins.

Loins, and the upper part of its sides to the Ilia, and its Point to the Os Coccigis. It is Concave and smooth on its foreside, but Convex and unequal on its backside. It hath five Holes on each side, but the Nerves pass only through the five on its foreside. Its acute Processes or Spines are shorter and less than those of the Loins, and the lower is always shorter than the upper.

The Os Coccigis is joined to the Ex-Os Coccigis.

tremity of the Os Sacrum; it is composed of three or sour Bones, of which the lower is still less than the upper, till the last ends in a small Cartilage; it resembles a little Tail turned inwards; its Use is to sustain the straight Gut; it yields to the pressure of the Fætus in Women in Travail, and Midwives use to thrust it backwards, but sometimes rudely and violently, which is the occasion of great Pain, and of several bad Effects.

From what has been said, it is easie to understand how the Motion of the Back is performed: Though each particular Vertebra has but a very small Motion, yet the Motion of all is very considerable. We have said, that the Head moves only backwards and forwards upon the first Vertebra, and semi-circularly upon the second. The small Protuberance which we have remarked

L 3

in the Bone of the hind Head, falling upon another in the first Vertebra, stops the Motion of the Head backwards, that it compress not the Spinal Marrow; and when the Chin touches the Sternum, it can move no farther forwards. The Oblique or Semicircular Motions are limited by the Ligament which ties the Process of the second Vertebra to the Head, and by those which tie the first to the lecond Vertebra. The Motion of the other Vertebra of the Neck is not fo manifest; yet it is greater than that of the Vertebra of the Back, because their acute Processes are short and straight, and the Cartilages which are between their Bodies thicker. The twelve Vertebre of the Back have the least Motion of any, because their Cartilages are thin, their acute Processes are long, and very near to one another; and they are fixed to the Ribs, which neither move torwards nor backwards. But the greatest Motion of the Back is performed by the Vertebra of the Loins, because their Cartilages are thicker, and their acute Processes are at a greater distance from one another; for the thicker the Cartilages are, the more we may bend our Body forwards; and the greater distance there is betwixt the acute Processes, the more we may bend our felves backward.

This

This is the Structure and Motion of the Vertebra, when they are in their natural Polition: but we find them also in feveral Persons several ways distorted. If the Vertebra of the Back flick out, fuch as have this Deformity are said to be Bunch-back'd; and in fuch the Cartilages which are between the Vertebræ are very thin and hard forwards, but confiderably thick backwards, where the oblique Processes of the Superiour and Inferiour Vertebra are at a confiderable diffance from one another, which distance fills up with a viscous Substance. This inequality of the thickness of the Cartilages happens either by a relaxation or weakness of the Ligaments and Mulcles which are fasten'd to the backfide of the Vertebra, in which case their Antagonists finding no oppofition, remain in a continual contraction, and confequently there can be no Motion in these Vertebra. If this Deformity has been from the Womb, then the Bones being at that time foft and tender, the Bodies of the Vertebræ partake of the same inequality as the Cartilages. If the bunch be towards one Shoulder. for example, towards the right, then the Cartilages on that fide are very thick, but thin and dry on the other fide; on the left fide the oblique Apophyles come close together, but on the L4 right

right there is a confiderable distance betwixt them; and the Ligaments and Muscles are greatly extended on the right fide, but those on the left are as much contracted. If the Vertebra are distorted inwards, all things have a different face: The Cartilages, and fometimes the Vertebra are very thick forwards, but mighty thin and hard backwards: The acute and oblique Processes are very close to one another, and the Ligaments upon the Bodies of the Vertebra are greatly relaxed, but the Muscles and Ligaments which tie the Processes together are very much contracted. These Distortions seldom happen in the Vertebra of the Loins; but fuch as are so miserable, have little or no Motion of their Back.

S E C T. IX. Of the Ossa Innominata.

THE Ossa Innominata are two large Bones situated on the sides of the Os Sacrum; in a Fætus they may be each separated into three pieces, which in Adults unite and make but one Bone, in which they distinguish three Parts. The first and Superiour Part is call'd Os Ilium; the Intestine Ileum lieth between it and its fellow. It is very large,

large, almost of a Semicircular figure, a little Convex and uneven on its External side, which is called its Dorsum, and Concave and smooth on its Internal side, which is call'd its Costa. Its Circumference or Edge is call'd its Spine. It is joined to the sides of the three Superiour Vertebra of the Os Sacrum by a true Suture: It is larger in Women than in Men.

The second is the Os Pubis, which is Os Publis the Inseriour and Forepart of the Os Innominatum; 'tis united to its fellow of the other side by an intervening Cartilage, by which means it makes the forepart of the Pelvis or Bason, of which the Os Sacrum is the backpart, and the

Lia the fides.

The third is the Inferiour and Poste. Os Ischiums riour, call'd Ischium or Coxendix; it has a large Cavity call'd Acetabulum Coxendicis, which receives the head of the Thigh-Bone; the Circumference of this Cavity is tipt with a Cartilage call'd its Supercilium, where it joins the Os Pubis; it has a large Hole call'd Foramen Ischij & Pubis, about the Circumference of which the Muscles called Obturator Internus and Externus arise. And at its lower end it has a large Protuberance upon which we fit, and from whence the benders of the Leg. arise. And a little above this, upon its hinder

Coftæ.

hinder part, it has another simall acute Process, betwixt which and the former Protuberance lies the Sinus of the Ischium, through which the Tendon of the Obturator Internus passes.

SECT. X. Of the Ribs.

THere are four and twenty Ribs, twelve on each fide of the twelve Vertebra of the Back; they are crooked, and like to the Segments of Circles; they grow flat and broad as they approach the Sternum, but the nearer they are to the Vertebra they are the rounder and thicker, at which end they have a round head, which being covered with a Cartilage, is received into the Sinus in the bodies of the Vertebra; and at the neck of each head (except the two last Ribs) there is a small Tubercle, which is also received into the Sinus of the transverse Processes of these same Vertebra. The Ribs thus articulated, make an acute Angle with the Lower Vertebra

The Ribs have each a small Canal or Sinus, which runs along their under sides, in which lies a Nerve, Vein, and Artery. Their Extremities, which are fastened to the Sternum, are Cartilaginous,

ginous, and the Cartilages make an obtuse Angle with the bony part of the Rib; this Angle respects the Head. The Cartilages are harder in Women than in Men, that they may the better

bear the weight of their Breafts.

The Ribs are of two forts; the leven upper are call'd Costa Vera, because their Cartilaginous ends are received into the Sinus of the Sternum. The five lower are call'd Falle, because they are shorter and fofter, of which only the first is joined to the Extremity of the Sternum, the Cartilaginous Extremities of the rest are tied to one another, thereby leaving greater space for the dilatation of the Stomach and Intrals-The last of these False Ribs is shorter than all the rest; it is not tied to them, but fomerimes to the Midriff, and fometimes to the Musculus Obliquus Descendens.

If the Ribs had been articulated with the Bodies of the Vertebra at right Angles, the Cavity of the Thorax could never have been enlarged in breathing. If each Rib had been a rigid Bone articulated at both ends to two fixed points, the whole Cheft had been immoveable. If the Ribs had not been articulated to the Transverse Processes of the Vertebra, the Sternum could not have been thrust out to that degree it is now, or the

Cavity

Cavity of the Thorax could not have encreased to much as is requisite in Inspiration. For when the Ribs are pulled up by the Intercostal Muscles, the Angle which the Cartilages at the Sternum make with the bony part of the Rib must be encreased, and consequently its Subtense, or the distance between the Sternum and the Transverse Processes, lengthened. Now, because the Rib cannot move beyond the Transverse Process, upon the account of its Articulation with it; therefore the Sternum must either be thrust to the other fide, or else outwards. It cannot move to the other side, because of an equal pressure upon the same account there, and therefore it is thrust outwards, or the distance between the Sternum and the Vertebra is encreased. The last Ribs, which do not reach the Sternum, and consequently conduces nothing in this action, are not articulated with the Transverse Processes.

If we suppose the Cavity of the Thorax to be half a Sphæroide, whose Semy-Axis is the height of the Thorax, or 15 Inches, and the Diameter of its greatest Circle 12 Inches, then the Cavity of the Thorax contains 1130 Cubick Inches. But in an easie Inspiration the Sternum is raised 10 of an Inch, (as I am assured by an exact

Experi-

Experiment) upon which account the Cavity of the Thorax is encreased to 1150 Cubick Inches. To this if we add the space the Diaphragma leaves, which is the Segment of a Sphere, whose Diameter is 15 Inches, and the Solidity of the Segment 183 Inches, we shall have 22 Inches more, if the Diaphragma descends but one Inch; but if it descends an Inch and an half, it leaves room for 52 Inches of Air to enter; and if it descends 2 Inches, the Cavity of the Thorax will be encreased upon the account of the motion of the Diaphragma alone 86 Inches. So that in the least Inspiration we can fairly suppose, the Lungs are distended with 42 Inches of Air, and they may be fornetimes with above 70 or 100.

SECT. XI.

Of the Breast-Bone.

THE Sternum or Breast-Bone is stuated in the middle of the Breast; it is composed of seven or eight Bones in Infants, which at first are Cartilaginous, but which harden and unite into three Bones after they are seven years old: The Substance of these Bones is not solid, but somewhat spongious.

The

The first and uppermost Bone is the biggest and largest; it is uneven and rough on its outside, but smoother on its inside, where it has a shallow surrow which gives way for the descent of the Wind-Pipe. It has a Sinus lined with a Cartilage on each side of its upper end, wherein it receives the Heads of the Clavicula.

The fecond is longer and narrower than the first, and on its sides there are several Sinus's, in which the Cartilaginous ends of the Ribs are received.

The third is shorter, but broader than the second; it receives into the Lateral Sinus's the Extremities of the last true Ribs; it terminates into a Cartilage which hardens sometimes into a Bone, call'd Cartilage Xiphoides, or Ensiformis, because it is broad at its upper end, where it joins the third Bone, and grows narrower to its Extremity, where it is sometimes forked, and sometimes it bends inwards, compresses the upper Orifice of the Stomach, and causes a great Pain and Vomiting.

The Use of the Sternum is to defend the Heart, and to receive the Extremi-

Such locations and a Morenton

ties of the true Ribs.

SECT. XII.

Of the Claviculæ and Scapulæ.

THE Claviculæ or Chanel-Bones Claviculæ, are two in number, situated at the basis of the Neck, above the Breast, one on each side; they are pretty long and small; at one end they are joined to the Production of the Scapula, called Acromion, by the Articulation called Synchondrosis at the other end, to the upper end of the Sternum by the Articulation call'd Arthrodia; they are crooked like an Italian (f) for the passage of the Vessels which pass under them, and to facilitate the motion of the Arms.

Their Substance is Spongious, therefore they are the more easily broken, and the sooner united when broken: Their Use is to sustain the Scapula to which the Arms are articulated. And because the Pectoral Muscle which pulls the Arm a cross the Breast, is inserted near the upper end of the Humerus Bone; therefore if the Clavicula did not keep the Scapula, to which the Head of the Humerus is joined always at an equal distance from the Sternum, the upper part of the Arm, and not the Hand, must have been pulled forwards.

The

Of the Claviculæ and Scapulæ.

232 Scapulæ.

The Scapula, Ομοπλάτα, or Shoulderblades, are two large and broad Bones. like the Triangle call'd Scalenum; they are situated on each side of the upper and back part of the Thorax. Substance of the Scapula is thin, but folid and firm; its outfide is somewhat Convex, and its infide Concave; its upper edge is call'd Cofta Superior, and its lower Costa Inferior; its broad end is called its Basis, which, with the two edges, make the upper and lower Angles. They have each three Processes, of which the first runs all along the middle of their outfide, and 'tis called their Spine. That end of the Spine which receives the Extremity of the Clavicula is call'd Acromion. The second Process is a little lower than the Acromion; 'tis short and sharp like a Crow's Bill, therefore call'd Coracoides; these two Processes are tied to one another by a throng Ligament which ferves to keep the Head of the Humerus in the Cavity of the third Process, which is call'd Cervix. This Process is the Extremity of the Scapula, which is oppofite to its Basis. It has a round Sinus, tipt about its brim with a Cartilage which receives the Head of the Humerus.

The Use of the Scapula is to receive the Extremities of the Clavicula and Humerns.

Humerus, for the easier motion of the Arm, and to give a rise to the Muscles which move the Arm.

SECT. XIII.

Of the Bones of the Arm and Hand.

HE first Bone of the Arm is the The Humerus. Humerus, or Shoulder-Bone; 'tis long and round, its Substance or Fibres are pretty folid and compact; it has a pretty wide and long Cavity in its middle, in which is contained its Marrow. At its upper end it has a round Head covered with a Cartilage, which is received into the Cavity of the Neck of the Scapula. In the forepart of the Head there is a Chanel in which a Tendon of the Biceps lies; but because this Head is much larger than the Cavity, therefore there is a strong Ligament which rifes from the edge of the Cavity of the Scapula, and forming a Bag round the Head of the Humerus, is inferted between the Epiphysis and the Bone. Thus the Articulation of the Humerus with the Scapula is an Arthrodia or Ball and Socket, that the Arm might have all manner of motions. But the greatest part of the Socket is made of a Ligament: For though the Joint would have been stronger if the Cavity

Cavity had been all of Bone; vet the Neck of the Humerus being large and strong, the Compass of the Arm must have been very fmall. The lower end of the Humerus, which is thinner and broader than the other, has two Protuberances. The External is received into the Extremity of the Radius; from the Internal the Muscles which bend the Fingers and Hand arise; and between these two Protuberances there are two small semicircular Risings, with a middle Chanel, by which the Humeras is joined to the Ulna by a Ginglymus. On the forefide of these Protuberances there is a small Sinus which receives the fore Process of the Ulna; and on the backfide there is another large Sinus which receives the Olegranum.

Ulna.

The Ulna or Cubitus is a long and hard Bone with a Cavity in its middle; it lies on the inside of the fore Arm, reaching from the Elbow to the Wrist; it is big at its upper end, and grows smaller to its lower end. At its upper it has two Processes which are received into the fore and hind Sinus's of the Extremity of the Humerus: The foremost Process is small and short; the hindmost, call'd 'Oxenegro', is bigger and longer; it stays the fore-Arm when it comes to a straight line with the Arm. Betwixt these Processes it has a semi-circular

circular Sinus, which receives the inner Protuberance of the lower end of the Humerus, upon which we bend and extend our fore-Arm. And along the middle of that there runs a small ridge by which this Bone is articulated to the Humerus by Ginglymus. Had the Articulation here been an Arthrodia, the Joint must have been much weaker. but the Hand could have received no more motion from it than it has now from the Shoulder.

The infide of this upper end has a small Sinus which receives the Circumference of the round Head of the Radius. Its lower Extremity, which is round and small, is received into a Sinus in the lower end of the Radius, and upon this Extremity it has a short and small Process, from which the Ligaments which tie it to the Bones of the Wrist arise; this Process serves to keep the Bones of the Wrist in their place.

The Radius is another Bone of the Radius. fore-Arm, which accompanies the Ulna from the Elbow to the Wrist; in its upper end it has a small Cavity which receives the outer Protuberance of the Humerus. The Circumference of this Cavity rouls in the small Sinus in the upper end of the Ulna. Near its lower end, which is bigger than its upper, it has a little Sinus which receives the

end of the Ulna, and in its Extremity it has two Sinus's which receive the Bones of the Wrist. Although the Ulna and the Radius accompany one another, yet they touch not but at their Extremities. They bend from one another in their middle, but they are tied together by a strong and broad mem-

branous Ligament.

The upper end of the Ulna is the biggest, because upon it and not upon the Radius the Articulation at the Elbow is performed; but the lower end of the Radius is biggest, because upon it only the Hand is articulated. The Radius moves either backwards or forwards upon the Ulna, by which means the Palm of the Hand is turned either upwards or downwards, which two Motions are called Pronation and Supination. Nor could any other Articulation have given thefe two Motions to the Hand; for though an Arthrodia admits of a motion to every fide, yet we cannot by that turn the forepart of our Arm backwards; and how useless our Hands had been without these Motions, every one may eafily perceive.

The Bones of the Carpus.

The Carpus or Wrist is made up of eight little Bones of a different figure and bigness; they are placed in two ranks, four in each rank. The first rank.

rank is articulated with the Radius. The second with the Bones of the Metacarpus. The last little Bone of the sirst rank lies not at the side of the third, which answers to the Bone of the Metacarpus of the Little Finger, as all the rest do by one another, but it lies upon it; they are strongly tied together by the Ligaments which come from the Radius, and by the annulary Ligament, through which the Tendons which move the Fingers pass. Although this Ligament be thought but one, yet it gives a particular case to every Tendon which passes through it.

The Metacarpus is made up of four The Bones of Bones which answer the four Fingers; the Metacar-

that which sustains the Fore-finger is pust the biggest and longest; they are round and long, a little Convex and round towards the Back of the Hand, and Concave and plain towards the Palm. They are hollow in their middle and sull of Marrow; they touch one another only at their Extremities, leaving spaces in their middle, in which lie the Musculi Interossei. In their upper end there is a Sinus which receives the Bones of the Wrist, and their lower Extremity is round, and is received into the Sinus of the sirst Bones of the Fingers.

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The Bones of the Fingers and Thumb The Bones of are fifteen in each Hand, three to each the Fingers.

Finger;

Finger; they are a little Convex and round towards the Back of the Hand. but hollow and plain towards the Palm, except the last where the Nails are. The order of their disposition is called First. Second and Third Phalanx. The First is longer than the Second, and the Second than the Third. The upper Extremity of the First Bone of each Finger has a little Sinus which receives the round Head of the Bones of the Metacarpus. The upper Extremity of the Second and Third Bones of each Finger hath two small Sinus's parted by a little Protuberance; and the lower Extremity of the first and second Bones of each Finger has two Protuberances, divided by a small Sinus. The two Protuberances are received into the two Sinus's of the upper Extremity of the fecond and third Bones; and the small Sinus receives the little Protuberance of the same end of these same Bones. The first Bone of the Thumb is like to the Bones of the Metacarpus, and it is joined to the Wrist and second of the Thumb, as they are to the Wrist and first of the Fingers. The second Bone of the Thumb is like the first Bores of the Fingers, and it is joined to the first and third, as they are to the Bones of the Metacarpus, and fecond of the Fingers. The Fingers are moved

moved fide-ways only upon their first

Toint.

Besides these Bones, there are some Offa Sesa-small ones call'd Offa Sesamoidaa, be-moidaa. cause they resemble the Grains of Sesamum, they are reckoned about twelve in each Hand; they are placed at the Joints of the Fingers, under the Tendons of the Flexores Digitorum, to which they serve as so many Pulleys.

SECT. XIV.

Of the Bones of the Thighs, Legs, and Feet.

THE Thigh has only one Bone, which is the longest of all the Bones of the Body; its Fibres are close and hard; it has a Cavity in its middle; 'tis a little Convex and round on its foreside, but a little hollow, with a long and small ridge call'd Linea Aspera on its backside. At its upper end it has three Epiphyses which separate easily in Children.

The first is its Extremity, which is a large and round Head covered with a Cartilage, which is received into the Acetabulum Coxendicis, wherein it is tied by two Ligaments. The first is pretty large, and comes from the edge of the Acetabulum. The second is round

and short, it comes from the bottom of the Acetabulum, and is inserted into the middle of the round Head : The Part immediately below this round Head, which is small, long, and a little oblique, is call'd its Neck. It makes an Angle with the Body of the Bone, by which means the Thighs and Feet are kept at a distance from one another, and we stand firmer, the Linea Propensionis easily falling perpendicular upon any part of the quadrangular space between the Feet. Besides, this obliquity of the Neck of the Bone it conduces much to the strength of the Muscles of the Thigh, which must have otherwise pass'd very near to the Center of Motion.

Trochanter Major. The fecond is call'd Trochanter Major; it is a pretty big Protuberance on the External side of the Thigh-Bone, just at the root of the Neck; it is rough, because of the insertion of some Muscles into it. It has a small dent at its root, into which the Musculi Quadragemini and the Obturatores are inserted.

Trochanter Minor, The third is call'd Trochanter Minor; it is on the hind-side of the Thigh-Bone, a little lower and less than the other. These Protuberances encrease mightily the force of the Muscles, by removing not only their Insertions, but likewise their Directions from the Center of Motion.

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The lower Extremity of the Thigh-Bone, which is articulated with the Tibia by Ginglymus, is divided in the middle by a Sinus into two Heads or Protuberances, the External and the Internal, which are received into the upper Sinus's of the Tibia. Through the space which is between the hind-parts of these two Heads pals the great Veffels and Nerve which go to the Leg; because the upper end of the Thigh-Bone was articulated by an Arthrodia, that we might not only move our Legs backwards or forwards, but likewife nearer to, or farther from one another; therefore its lower Extremity was joined to the Tibia by Ginglymus, which is the strongest Articulation.

In the Knee there is a little round Patella. Bone about two Inches broad, pretty thick, a little convex on both sides, covered with a smooth Cartilage on its foreside; it is soft in Children, but very hard in those of riper Years; it is called Mola, Patella, or Pan; over it pass the Tendons of the Muscles which extend the Leg, to which it serves as a Pulley for facilitating their Motion, by removing their Direction from the Centre

of Motion-

In the Leg there are two Bones, the Tibia.
inner and bigger is call'd Tibia, or Focile
Majus; 'tis hard and firm, with a

Cavity

Cavity in its middle; 'tis almost triangular; its fore and sharp edge is call'd the Shin. In its upper Extremity it has two large Sinus's tipt with a foft and Supple Cartilage call'd Cartilago Eunata from its figure: It runs in between the Extremities of the two Bones, and becomes very thin at its edge. Like those in the Articulation of the Lower Jaw, it facilitates a small side-motion in the Knee. The Sinus's receive the two Protuberances of the Thigh Bone, and the Production which is between the Sinus's of the Tibia is received in the Sinus which divides these two Protuberances of the Femur. By bending our Knee. we bring our Leg, in walking in a straight line, forwards, which without this Articulation we could not have done, but, like those who have the misfortune to have a Wooden Leg. we must have brought our Foot about in a femicircle in going even upon a Plain, but more evidently upon an Afcent.

On the side of this upper end it has a small Knob, which is received into a small Sinus of the Fibula; and on its fore-part, a little below the Patella, it has another, into which the Tendons of the Extensors of the Leg are inserted. Its lower Extremity, which is much smaller than its upper, has a remarkable

Process

Process which forms the inner Ankle, and a pretty large Sinus divided in the middle by a finall Protuberance; the Sinus receives the convex Head of the Astragalus, and the Protuberance is received into the Sinus, in the convex Head of the same Bone. It has another Allow Sinus in the fide of its lower

which receives the Fibula.

The outer and leffer Bone is called Fibula Hepovn, Fibula, or Focile Minus; though it be much sinaller than the Tibia, yet tis nothing shorter. It lies in the outfide of the Leg; and its upper end, which is not so high as the Knee, receives the lateral knob of the upper end. of the Tibia into a small Sinus which it it has in its inner fide. Its lower end is received into the small Sinus of the Tibia. and then it extends into a large Process which forms the outer Ankle, embracing the external fide of this Afragalus. The Tibia and Fibula touch not one another but at their ends; the space which they leave in their middle is filled by a strong membranous Ligament. and some Muscles which extend the Feet

and Toes. In the Foot we distinguish three Parts. the Tarsus, Metatarsus, and Toes.

The Tarfus is the space between the The Bones of Bones of the Leg and the Metatarfus ; the Tarfus are it is composed of seven Bones.

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The

Of the Bones of the Thighs, &c.

244 Aftragalus,

Aftragalus. The first is call'd the Astragalus or Talus. In its upper part it has a convex Head, which is articulated with the two Fociles of the Leg by a Ginglymus, being it is divided by a little Sinus which receives the small Protuberance in the middle of the Sinus of the Tibia. And without this Articulation, we must always, in going, have trod upon the Heel with our fore Foot, and upon our Toes with our hind Foot. The fore part of the Astragalus, which is also convex, is received into the Sinus of the Os Naviculare. Below, towards the hind-part of its under fide, it has a pretty large Sinus which receives the upper and hind part of the Os Calcis. But towards the fore part of the same side it has a Protuberance, which is received into the upper and fore part of the fame Bone. Betwixt this Sinus and this Protuberance there is a Cavity which anfwers to another in the Os Calcis, in which is contained an oily and mucous fort of Substance for moistening the Ligaments, and facilitating the obscure Motion of these Bones when we go.

Calcaneum. The second Bone of the Tarfus is the Calcaneum, Os Calcis, or Heel-Bone, it is the biggest of the Bones of the Tarfus. It lies under the Astragalus, to which it is articulated by Ginglymus, as we have

now described. Behind it has a large Protuberance which makes the Heel; and into which the Tendo Achillis is inferted; and before it has a Cavity which receives a part of the Os Cubiforme.

The third is the Os Naviculare or Naviculare. Cymbiforme; it lies between the Aftragalus and the three Ossa Cuneisormia. Behind it has a large Sinus, which receives the fore convex Head of the first; and before it is convex, distinguished into three Heads, which are received into the Sinus's of the Ossa

Cuneiformia.

The fourth, fifth and fixth are cal Off Cuneiled Offa Cuneiformia, because they are formialarge above, and narrow below; they lie all three at the side of one another; their upper side is convex, and their under hollow, by which means the Muscles and Tendons in the Sole of the Foot are not hurt when we go. At one end they have each a Sinus, which receives the Os Naviculare, and at the other end they are joined to the three inner Bones of the Metatarsus, the inmost of these Bones is the biggest, and that in the middle the least.

The seventh Bone is called the Os Os Cubi-Cubiforme, because of its figure; it lies forme. in the same rank with the Ossa Cuncisormia. Behind it is joined to the Os

M'3 Calcis,

Calcis, before to the two outer Bones of the Metatarjus, and on its infide it is joined to the third Os Cuneiforme.

Metatarfus.

The Bones of the Metatarsus are five; that which sustains the Great-Toe is the thickest, and that which sustains the next Toe is the longest; the rest grow each shorter than another. They are longer than the Bones of the Metatarsus; in other things they are like them, and they are articulated to the Toes, as they are to the Fingers.

The Bones of the Toes,

The Bones of the Toes are fourteen. The Great-Toe hath two, and the rest have each three; they are like to the Bones of the Fingers, only they are shorter.

In the Toes there are sometimes found twelve Ossa Sesamoidaa, as in the Fingers.

SECT. XV.

Of the Nails, and Number of the Bones.

THE Nails which are upon the Extremities of the Fingers and Toes, feem to be of the same Nature as the Hooffs of other Animals. It you take the Hooff carefully off a Horse, Ox, or Hog, you shall see that it is nothing but a bundle of small Husks which answer to so many Papilla of the Skin. From

From whence we may conclude, that the Nails are nothing but the covers or sheaths of the Papilla Pyramidales of the Skin on the Extremities of Fingers and Toes, which dry, harden, and lie close upon one another: Their Use is to defend the Ends of the Fingers when we handle any hard or rugged body.

The Bones of a Skeleton, are,

The Os Frontis 1
Occipitis 1
Offa Parietalia 2
Temporum 2
Officula Auditus 8
Os Ethmoides 1
0-1
Mali . 2
Maxillare 2
Nasi 2
Palati 2
Maxilla Inferior 1
Dentes Incifivi 8
Canini
Molares 20
Os Hyoides 1
of the company of the same
recinque sidos para 61

The Bones of a Skeleton.

Vertebra Cervicis	7
Dors	12
Lumborum	5
Ossi Sacri Os Coccygis	6
Scapula	3
Clavicula	2
Coft a Sternum	24
Ossa Innominata	1 2
	_
Th- 17	64
The Humerus Ulna	2
Radins	2 2
Osa Carpi	16
Metacarpi	8
Digitorum	30
	60
The Os Femuris	2
Rotula Tibia	2
Fibula	2
Offa Tarfi	14
Metatarfi	10
Digitorum	28
	60
In all 2	45

Besides the Ossa Sesamoidea, which are said to be found to the Number of 48.

CHAP. VI.

Of the Muscles which are not yet described.

SECT. I.
Of the Muscles of the Face.

Muscle call'd Corrugator Itarises from the great Canthus of the Orbit, and terminates in the Skin about the middle of the Eye-brows. Some reckon this Pair only a Prolongation of the Frontales; their Name declares their Use.

The Nose has three Muscles. The first arises from the upper end of the two Bones of the Nose, and are inserted into the upper part of the Ale. They pull the Nose upwards.

The second Pair grise from the Os Maxillare, and are inserted into the sides of the Ala. They dilate the Nostrils.

The third Pair arises from the same Bone, above the Dentes Incisorij, and are inserted into the Extremities of the Ale, which they pull downwards.

The Muscles of the Lips are five Pro-

per Pair.

These

The Incisions, or Elevator Labii Superioris; it arises from the upper part of the face Bone of the Upper Jaw, and descending obliquely is inserted into the Upper Lip above the Dentes Incisorij.

Its Antagonist is the Triangularis, or Depressor Labii Superioris; it ariseth from the lower edge of the Lower Jaw, between the Massater and the Quadratus, and ascendeth by the Angle of the

Mouth to the Upper Lip.

The Caninus, or Elevator Labii Inferioris; it ariseth from the Table Bone of the Upper Jaw, below the Incisious; it descends and passes under the Insertion of the Zygomaticus, and is inferted into the Under Lip. This Muscle is affisted by another small but strong Pair of Muscles, first observed by Mr. Comper, and by him call'd Elevator Labii Inferioris: They arise from the Gums of the Dentes Inciforii, and descending directly, are inserted into the lower part of the Skin of the Chin. When they act, they pull the Skin of the Chin, and confequently thrust the Lower Lip upwards.

Its Antagonist is the Quadratus, or Depressor Labii Inferioris; this is some thin, sleshy Fibres, which lie immediate under the Skin, upon the Chin, on each side of the former; they arise from the edge of the forepart of the

Under

Under Jaw, and are inserted into the Upper Lip.

There are three Muscles common to

both the Lips.

The first and the second are Zygomatici, one on each side; they come from the Os Zygoma, and going obliquely they are inserted near the Angles of the Lips. When one of these Muscles asteth, it draws both Lips obliquely to a side; they receive often some Fibres from the Caninus.

The third is the Orbicularis, or Sphin-Ger Labiorum; it surrounds the Lips with Orbicular Fibres; when it acteth,

it draws the Lips together.

There is one Muscle on each side common to the Lips and Cheeks, which is the Buccinator; it lies under the other Muscles; it makes the inner Substance of the Cheeks; its Fibres run from the Processus Corone of the Lower Jaw to the Angle of the Mouth, and they adhere to the upper part of the Gums of both Jaws. Through its middle pass the upper Dustus Salivales; by this Muscle we contract the Cavity of our Mouth, and thrust the Meat between our Teeth.

The Mulcles of the Lower Jaw are

twelve Pair, fix on each fide.

The first is the Temporalis, or Crotaphites; it arises by a semicircular sleshy beginbeginning from a part of the Os Frontis, from the lower part of the Parietale, and upper part of the Temporale. From thence they go under the Zygoma, and gathering together as to their Centre, they are inferted by a short but strong Tendon into the Processus Corone of the

Lower law.

The second is the Massater; it is a thick and short Muscle; it arises from the Zygoma, and from the first Bone of the Upper Jaw, and is inserted into the lower edge of the Lower Jaw, from its External Angle to its middle. Its Fibres run in three Directions; those which come from the Zygoma run obliquely to the middle of the Jaw; and those from the first Bone of the Upper Jaw cross the former, and run to the Angle of the Lower Jaw; and the Fibres which are in its middle run in a perpendicular from their Origin to their Insertion. These two Muscles pull the Jaw upwards.

The third is the Pterigoidaus Internus; it arises from the internal part of the Processus Pterigoidaus, and descends to be inserted into the inferiour part of the internal side of the Lower Jaw, near its Angle: When this Muscle acteth, it

draweth the law to a fide.

The fourth is the Pterigoidans Externus; it ariseth from the external part of the same Process, and goes backwards to be inserted between the Processus Condiloides and the Corone on the inside of the Lower Jaw. This Muscle pulleth

the Lower law forwards.

The fifth is the Quadratus; this is a broad, membranous Muscle, which lies immediately under the Skin; it ariseth from the upper part of the Sternum, from the Clavicula, and from the Acromium; it covereth all the Neck, and adheres firmly to the lower edge of the Lower Jaw; and being produced, it covers also the lower part of the Cheeks. When this Muscle acteth, it pulleth the Cheeks and Jaw downwards.

The fixth is the Digastricus; it ariseth fleshy from the upper part of the Processus Mastoideus, and descending it contracts into a round Tendon, which passes through the Stylobyoideus, and an annular Ligament which is fix'd to the Os Hyoides; then it grows fleshy again, and ascends to the middle of the edge of the Lower Jaw, where it is inserted. When this Muscle acteth, it pulleth the Lower Jaw down, by help of the annular Pulley, which alters its Direction.

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SECT. II.

Of the Muscles of the Head.

THE Head is lifted up or pulled backwards by four Pair of Muscles.

The first is the Splenius, which ariseth from the four upper Spines of the Vertebra of the Back, and from the two lower of the Neck; and ascending obliquely, it adheres to the upper transverse Processes of the Vertebra of the Neck, and is inserted into the upper part of the Occiput.

The second is the Complexus; it ariseth from the transverse Processes of the Vertebra of the Neck, and ascending obliquely it adheres to the Spines of the same Vertebra, and is inserted into the Occiput: When one of these Muscles acteth, it moves the Head backwards to

one fide.

The third is the Rectus Major; it ariseth from the Spine of the second Vertebra of the Neck, and is inserted

into the lower part of the Occiput.

The fourth is the Rectus Minor; it lies under the Major; it cometh from the back-part of the first Vertebra of the Neck, and is inserted below the former: They nod the Head backwards.

The femicircular motion of the Head

is performed by

The Obliques Inferior, which comes from the Spine of the second Vertebra of the Neck, and is inserted into the transverse Process of the first.

The Obliques Superior comes from the transverse Process of the first Vertebra of the Neck, and is inserted into the lateral

and inferiour part of the Occiput.

The Mastoidaus arises fleshy from the upper part of the Sternum and extremity of the Clavicula; and ascending obliquely, 'tis inserted into the back-part of the Processus Mammillaris. When either of these Muscles acteth, the Head turneth to the contrary side.

The Head is bended forwards by

The Rectus Internus Major, which arises from the forepart of the five Interiour transverse Processes of the Vertebra of the Neck, and is inserted into the foremost Appendix of the Occipital

Bone, near its great hole.

The Rectus Internus Minor, observed and described by that accurate Anatomist Mr. Comper, in his most exact Treatise of the Muscles; it lies on the forepart of the first Vertebra, like the Rectus Minor on the back part, and is inserted into the Anterior Appendix of the Os Occipitis immediately under the former. These nod the Head forwards.

wards, being Antagonists to the Relli

Fallopius has described another Pair, called Resti Laterales, which come from the transverse Processes of the first Vertebra, and are inserted near the Processus Mammillaris; they help to move the Head a little to one side.

SECT. III.

Of the Muscles of the Neck.

THE Neck is bended and extended; it is bended by two Pair of

Muscles.

The first is the Longus, which is fastened to the bodies of the five upper Vertebra of the Back, and to all those of the Neck; but because the last are more moveable than the first, therefore they are its Insertion, and those of the

Back its Origination.

The Scalenus arises from the first and second Ribs; and ascending, is inserted into all the transverse Processes of the Neck, except the first. This Muscle seems to be three; yet I will not encrease their number. It is perforated for the passage of the Veins, Arteries, and Nerves; because the Neck is more easily moved than that part of the Ribsto which they are fastened; therefore

it's justly reckon'd amongst the Benders of the Neck.

The Neck is extended by the Musculi Versebrales, of which afterwards.

SECT. IV.

Of the Muscles of the Scapula.

THE Scapula is moved backwards and forwards, upwards and down-

wards, by four Muscles.

The first is, the Serratus Minor Anticus; it ariseth thin and sleshy, from the second, third, fourth and fifth Superiour Ribs, and ascending obliquely, it is inserted sleshy into the Processus Carocoides of the Scapula, which it draws forwards; it helps also in Respiration.

The second is the Trapezius, or Cucullaris, because with its fellow it represents a Cowl; it arises from the Occiput above the Splenius, from the Spines of the Vertebra of the Neck, and from the eighth Superiour of the Back, and is inserted into the Spine of the Scapula to the Acromium and Clavicle: It moves the Scapula obliquely upwards, directly backwards, and obliquely downwards, according to the three Directions of its Fibres.

The third is the Rhomboides, so called from its figure; it lies under the Cucullaris;

258 Of the Muscles of Respiration, &c.

laris; it ariseth from the two Inferiour Spines of the Neck, and four Superiour of the Back, and is inserted fleshy into the whole basis of the Scapula, which it

draws backwards.

The fourth is the Levator Scapula; it arises from the second, fourth, and fifth transverse Processes of the Neck by so many distinct beginnings, which unite, and are inserted into the Superiour Angle of the Scapula, which it draws upwards: It is also call'd Musculus Patientia, because those who are any-ways grieved use it.

These Muscles may move the Arm, as those of the Arm move it, because of the connexion of the two Bones: They

help also in Respiration.

SECT. V.

Of the Muscles of Respiration, and of the Benders and Extensors of the Vertebræ.

THE Cavity of the Thorax is dilated and contracted in Respiration by nine and twenty Pair of Muscles; five and twenty Pair pull the Ribs up, three Pair accelerate their motion downwards, and one Pair, viz. the Diaphragma, helps both in the one and the other; this last we have described already.

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The Muscles which dilate the Thorax

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The Intercostales Externi in Interni; they are in number four and forty, one of each fort between every two Ribs; they arise from the lower edges of each Superiour Rib, and are inserted into the upper edges of each Inseriour Rib. Their Fibres decussate one another; those of the External run obliquely from the back-part forwards, but those of the Internal from the forepart backwards.

The Subclavius arises from the lower side of the half of the Clavicula that is nearest the Acromium, and descends obliquely to be inserted into the upper part of the sirst Rib, near the Sternum.

The Serratus Anticus Major; it comes from the whole basis of the Scapula, and is inserted into the seven true Ribs, and first of the false Ribs, by so many distinct portions which represent the teeth of a Saw. The Obliquus Descendens of the Abdomen lie between the spaces of its lower Indentations.

The Serratus Posticus Superior; it ariseth by a broad and thin Tendon from the two Inferiour Spines of the Vertebra of the Neck, and the three Superiour of the Back; and growing fleshy, 'tis inserted into the second, third and fourth Ribs by so many di-

flinct Indentations.

When

When all these Muscles act, they draw the Ribs upwards, bringing the Ribs to right Angles with the Vertebre; and consequently the Cavity of the Thorax must be wider and shorter: but because at the same time the Diaphragma contracts, therefore the Cavity is also longer.

The Muscles which contract the Ca-

vity of the Thorax, are,

The Triangularis; it arises from the lower part of the inside of the Sternum, and is inserted into the Cartilages where they join the Bones of the fourth, fifth, sixth, and sometimes seventh true Ribs.

The Serratus Posticus Inferior rises by a broad and thin Tendon from the three Inferiour Spines of the Vertebra of the Back, and from the two Superiour of the Loins; its Fibres ascending obliquely, grow fleshy, and are inserted by four Indentations into the four last Ribs.

The Sacrolumbus; it arises slessly from the Superiour part of the Os Sacrum, Posteriour part of the Spine of the Ilium, and from all the Spines and transverse Processes of the Vertebra of the Loins: It gives a small Tendon to the Posteriour part of each Rib near its Root, where a small bundle of slessly Fibres arises and unites with each ascending Tendon to the third, fourth, fifth and sixth Vertebra of the Neck. These Muscles

Muscles are of small force, and seem only to accelerate the motion of the Ribs, which fall down by their own gravity, and the elasticity of the Ligaments, by which they are bound to the Vertebræ.

The Muicles of the Back and Neck are very numerous, and variously described by Authors. I shall not multiply them, but take all that have the same Direction and Disposition for the same Muscle, though perhaps it may be divided into as many Muscles as there are Vertebra.

The first is,

The Longiffimus Dorfi. This Muscle at its beginning is not to be separated from the Sacrolumbus, arising with it from the back part of the Spine of the Ilium and upper part of the Os Sacrum; and as it ascends it gives Tendons to each transverse Process of the Vertebra of the Loins, Thorax, and Neck. When these Muscles act, they keep the Body erect. Under this lies

The Transversalis Dors, of which Authors commonly make three, viz. the Sacer, the Semi-spinatus, and Transversales Colli. This Muscle arises from the Os Sacrum, and from all the Transverse Processes of the Vertebra of the Loins, Back, and Neck, except the two first, and is inserted by so many distinct Tendons to all their

Superiour

Superiour Spines: This Muscle moves the whole Spine obliquely backwards.

The Inter-Spinalis, of which the first part is call'd (by Bidlow) Semi-Spinalis, and the other part (by Mr. Comper, who first observ'd them) Inter Spinales Colli : They arise partly fleshy and partly tendinous from the Spines of the Loins and the Inferiour of the Thorax, and are inferted into the fifth, fixth, and feventh Spines of the Thorax. These join the Longissimus Dorsi. The other part arises from the Superiour parts of each double Spinal Process of the Neck, except that of the Second Vertebra, and is inferted into the Inferiour parts of all the faid These Muscles draw the Spines Spines. of the Vertebra nearer one another.

The Spinalis Colli. It arises from the five Superiour Transverse Processes of the Vertebra of the Thorax, and Inferiour of the Neck, and is inserted with its fellow into the Inferiour part of the Second Vertebra of the Neck. They pull

the Neck directly backwards.

The Quadratus Lumborum. It ariseth from the posteriour part of the Spine of the Ilium, and is inserted into the inside of all the transverse Process of the Vertebra of the Loins. This Muscle moves the Body upon the Loins to one side, and both together help the Restus Abdominis in bending our Body forwards.

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The Vertebra of the Neck are bended by two Pair of Muscles, which have been already described. The Vertebra of the Back have no Benders, and those of the Loins are bended by the Muscles of the Lower Belly, and by one proper Pair which is call'd the Psoas Parvus; it arises fleshy from the sides of the upper Vertebra of the Loins, and it has a thin and broad Tendon which embraces the Psoas of the Thigh, and which is inserted into the Os Innominatum, where the Os Pubis and Ilium join together.

SECT. VI.

Of the Muscles of the Humerus, or Arm.

THE Arm moves five different ways, upwards, downwards, forwards, backwards, and round.

The Arm is lifted upwards by the Deltoides, Supra spinatus, and Coraco-brachialis.

The Deltoides is of a triangular figure, it comes from all the Spina Scapula, from the Acromium, from the External Half of the Clavicula; from all these places its Fibres drawing together, pass above the Articulation of the Humerus, and are inserted by a short Tendon, four fingers below the Head of the same Bone, almost on its External side. Steno shews that

that this Muscle is composed of twelve fimple Muscles: According to the direction of its Fibres, it pulls also the Arm

a little forwards and backwards.

The Supra-spinatus rises fleshy from all the basis of the Scapula, that is above the Spine. It fills all that space between the upper fide of the Scapula and its Spine, to which two it is also attached: It passes above the Acromium, over the Articulation of the Humerus, and is inferted into the Neck of the Humerus, which it embraces by its Tendon.

The Coracobrachialis rifes from the Processus Coracoides Scapula by a tendinous beginning; and passing over the Articulation, it is inferted into the middle and Internal part of the Humerus.

The Teres Major and the Latissimus

Dors pull the Arm downwards.

The Teres Major rifes from the lower Angle of the Scapula, and is inferted with the following a little below the

Head of the Humerus.

The Latissimus Dorsi, or Aniscaptor, with its fellow, covers almost all the Back. It hath a thin and large tendinous beginning, which comes from the Posteriour part of the Spine of the llium. from the Superiour Spines of the Os Sacrum, from all the Spines of the Vertebra of the Loins, and from the seven Lower

of the Thorax; it paffes by the Inferiour Angle of the Scapula, from which some of its fleshy Fibres sometimes arise, and is inferted with the Teres Major by a

strong and broad Tendon.

The Pectoralis moves the Arm forwards; it ariseth by a fleshy and Semicircular beginning from the inner half of the Clavicula, from the fix Superiour Ribs; it covereth a great part of the Breaft, and is inferred by a short but strong and broad Tendon into the upper and inner part of the Humerus, between the Biceps and Deltoides. Its Fibres near their Insertion decussate each other. Those which come from the Clavicle and first Ribs are on the lower side of the Tendon; and those from the inferiour Ribs are on the upper fide of the Tendon.

The Arm is drawn backwards by the Infra Spinatus, the Transversalis, and

the Sub-Scapularis.

The Infra-Spinatus covers all the space that is between the Spine of the Scapula an its inferiour fide; and passing between the Spine and the Teres Minor, 'tis inferted into the Neck of the Humerus.

The Transversalis, or Teres Minor. comes from the inferiour edge of the Scapula, upon which it runs between the former and the Teres Major, and is inferted

into the Neck of the Humerus.

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The Sub-Scapularis covers all the Internal fide of the Scapula; it rifes fleshy from its basis, from its upper and lower Costa, and is inserted into the Neck of the Humerus. It draweth the Arm close to the Ribs.

The Tendons of these three last Muscles surround the Articulation of the Humerus. When all these Muscles move successively, they move the Arm circularly.

SECT. VII.

Of the Muscles of the Cubitus and Radius.

THE Cubitus is bended and extended by fix Muscles; the Biceps and Brachiaus Internus bend it; the Longus, Brevis, Brachiaus Externus, and the

Anconeus, extend it.

The Biceps is so called, because it hath two Heads, of which one rises from the upper edge of the Cavity of the Head of the Scapula. This Head is round and tendinous, and is enclosed in the Chanel in the Head of the Humerus. The other arises from the Processus Coracoides; it is broad and tendinous, and both together unite about the middle and forepart of the Arm, and make one Belly, which is inserted, by a strong and round Tendon, into the Tubercle at the upper end of the

Of the Muscles of the Cubitus &c. 267

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the Radius. Some of the Fibres of this Tendon form a large and thin Aponeurofis which covers all the Muscles of the Radius and Fingers externally. Care ought to be taken in Blood letting, not to cut a-cross, but according to the length of the Fibres of this Aponeurofis.

The Brachiaus Internus lies partly under the Biceps; it arises by a fleshy beginning from the middle and internal part of the Humerus, and is inferted into the upper and fore-part of the Cubitus by a

very short but strong Tendon.

The Longus is the first of those which extend the Cubitus; it ariseth from the Interiour Costa of the Scapula, nigh its Neck, and paffeth betwixt the two round Muscles; it descendeth upon the backfide of the Humerus, where it joins with the two following.

The Brevis arises from the Superiour and Posteriour part of the Humerus.

The Brachieus Externus arises about the middle and Posteriour part of the Humerus. These three join their fleshy Fibres together, and being externally tendinous, they cover all the Elbow, and are inserted into the Olecranum.

The Anconeus is a small Muscle which arises from the backpart of the Extremity of the Humerus, paffes over the Elbow, and is inferted into the Lateral and Internal part of the Ulna, about three

268 Of the Muscles of the Cubitus, &c. three or four fingers breadth below the

Olecranum.

The Radius hath four Muscles, two Pronatores, which turn the Palm of the Hand downwards, they are the Rotundus and the Quadratus; and two Supinatores, which turn the Palm upwards, they are called Longus and Brevis.

The Rotundus arises fleshy from the Internal Extuberance of the Humerus, and goes obliquely to be inferted into the middle and External Part of the

Radius

The Quadratus arises by a broad and fleshy beginning from the lower and Internal Part of the Ulna; it passes over the Ligament that joins the Radius to the Ulna, and is inserted as broad as its beginning into the External and lower Part of the Radius.

The first of the Supinatores is the Longus; it ariseth by a fleshy beginning, three or four fingers breadth, above the External Extuberance of the Humerus. It lies all along the Radius, to whose Inferior and External Part it is inserted

by a pretty broad Tendon.

The second is the Brevis; it cometh from the External and upper Part of the Ulna, and passing round the Radim, 'tis inferted into its upper and forepart, below the Tendon of the Biceps.

SECT.

SECT. VIII.

Of the Muscles of the Palm of the Hand and of the Wrist.

THE Muscles of the Palm of the Hand are two.

The first is that which is commonly known by the Name of Palmaris; it ariseth from the Internal Extuberance of the Humerus, and by a long and Ander Tendon it passes above the Ligamentum Annulare to the Palm of the Hand, where it expands it felf into a large Aponeurosis, which cleaves close to the Skin above, and to the fides of the Bones of the Metacarpe below, and to the first Phalanx of the Fingers, by which means it makes four Cases for the Tendons of the Benders of the Fingers to pass through. This Muscle is fometimes wanting, but the Aponeurofis is always there.

The second may be called Palmaris Brevis; it lies under the Aponeurosis of the first; it arises from the Bone of the Metacarpus that sustains the Little-Finger, and from that Bone of the Carpus that lies above the rest. It goes transversely, and is inserted into the eighth Bone of the Carpus. The first assists the Hand to grasp any thing close-

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ly, and the second makes the Palm of the Hand concave.

The Muscles of the Wrist are four, two Internal for bending of it, and two

External for extending it.

The first is the Cubitaus Internus; it arises from the Internal Extuberance of the Humerus and upper part of the Ulna, upon which it runs all along till it pass under the Ligamentum Annulare, and is inserted by a strong and short Tendon into the fourth of the first order of the Carpus.

The second is the Radiaus Internus, which comes from the same part with the former, and lying along the Radius, it is inserted into the first Bone of the Metacarpus that sustains the Fore-finger. These two Muscles bend the Wrist.

The third, which is the first of the Extensors, is the Cubitans Externus; it cometh from the External Extuberance of the Humerus, and passing its Tendon under the Ligamentum Annulare, 'tis inferted into the fourth Bone of the Metacarpus that sustains the Little-Finger.

The fourth is the Radiaus Externus or Bicornis, which is two distinct Muscles; the first arises from above the External Protuberance of the Humerus, and the second from the lowermost part of the External Protuberance. They both lie along the External part of the Radius; they

they pass under the annular Ligament, and the one is inserted into the Bone of the Metacarpus that sustains the Fore-finger, the other to that which sustains the Middle-finger; these two extend the Wrist.

SECT. IX.

Of the Muscles of the Fingers.

THE Fingers are bended and extended, they are drawn to and from the Thumb by several Muscles. The Muscles which bend them are the Sub-

limis and the Profundus.

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The Sublimis, otherwise call'd Perforatus, arises from the Internal Protuberance of the Humerus, and from the upper and forepart of the Radius: It divides into four parts which send four Tendons, which pass under the annular Ligament to be inserted into the upper part of the second Phalanx of each of the four Fingers. Each of these Tendons, as they pass the first internode of the Fingers, have a slit in their middle, for the passage of the Tendons of

The Profundus, which lies under the Sublimis; it ariseth fleshy from the upper part of the Ulna, and from the Ligament that joins this Bone to the Radius: The lower part of its Body is outwardly

N.4.

tendi-

Tendinous; it divides into four round Tendons which pass under the annular Ligament, and through the slits of the former Tendons, to be interted into the

third Bone of the Fingers.

These Muscles have this in particular, that the Tendons of the uppermost give passage to the Tendons of the lower: And their Tendons upon the Palm of the Hand are enclosed in Cases from the Aponeurosis Palmaris, and upon the Fingers in strong membranous Cases which are fix'd to the sides of each Finger.

The Extensor Digitorum Communis arises from the External Protuberance of the Humerus, and at the Wrist it divides into three flat Tendons, which pass under the annular Ligament, to be inserted into all the Bones of the Fore, Middle, and Ring-Finger. These Tendons, near the first internodes of the Fingers, give some tendinous Fibres to each other, and some also to the Interossei.

The Lumbricales, or Vermiculares, are small Muscles which rise from the Tendons of the Profundus, and are inserted into the first internodes of each Finger. On their Internal sides next the Thumb they assist in bending the first Joint of

the Fingers.

The Interossei, some reckon six, and others, more justly, eight; they are contained betwixt the spaces of the Bones

Bones of the Metacarpus; the one half of them lies betwixt the spaces that these Bones leave towards the Palm of the Hand; they are the Internal Interoffei; they arise from the upper part of the Bones of the Metacarpus next the Carpus, and they are inserted on the Internal fides of the first Bones of the Fingers with the Lumbricales; they are the Adductores Digitorum, for they bring the Fingers to the Thumb. The other half are contained in the spaces that the Bones of the Metacarpus leave on the Back of the Hand; they rife from the upper part of the Bones of the Metacarpus next the Carpus, and they are inserted on the-External fides of the first Bones of the Fingers, and these are the Abductores Digitorum, for they draw the Fingers from the Thumb.

The Thumb is bended by two Muscles. The first arises from the Internal Extuberance of the Humerus, from the middle and inner part of the Radius, by two different orders of fleshy Fibres ; and paffing under the Ligamentum Annulare, its Tendon is inferted into the third Bone of the Thumb. The secondarises from the Bones of the Carpus, from the annular Ligament, and is inferred into the second internode of the Thumb : These two Muscles are call'd

Flexores Policis.

It is extended by three Muscles,

which are,

The Extensor Primi Internedii Pollicis. It arises from the upper and External part of the Ulna; it passes obliquely over the Tendon of the Radians Externus, and is inserted near the second Joint of the Thumb.

The Extensor Secundi Internodii Pollicis. It arises from the upper and Internal part of the Radius, and is inserted into the upper part of the second Bone

of the Thumb.

The Extensor Tertii Internadii Pollicis. It arises from the Ulna, a little below the First Extensor, and is inserted into the third Bone of the Thumb.

The Tenar draws the Thumb from the Fingers; it makes that Part which is call'd Mons Luna; it ariseth from the Ligamentum Annulare, and first Bone of the Carpus, and is inserted into the Ex-

ternal fide of the Thumb.

The Antitenar draws the Thumb to the Fingers; it rifeth from the Bone of the Metacarpus that fustains the Forefinger, and is inserted into the first Bone

of the Thumb.

The Abductor Indicis arises from the forepart of the first Bone of the Thumb, and is inserted into the Bones of the Fore-finger; it draws this Finger to the Thumb.

The Index hath a particular Extensor, which comes from the middle and External part of the Ulna; it passeth under the annular Ligament, and is inserted into the third Bone of the Fore-singer, where it joins the Extensor Communis.

The Little-finger hath two proper Muscles, the one draws it from the other Fingers, the other extends it. The first is call'd Hypotenar; it ariseth from the fourth Bone of the second rank of the Bones of the Carpus, and from the Ligamentum Annulare, and is inserted externally into the first Bone of the Little finger; this draws it from the other Fingers.

The Extensor of the Little-finger arises from the External Protuberance of the Humerus, and from the upper part of the Ulna; it passeth under the annular Ligament, and is inserted into the third

Bone of the Little-finger.

SECT. X.

Of the Muscles of the Thigh.

THE Thigh is bended and extended, moved outwards and inwards, obliquely and circularly, by thirteen Muscles.

It is bended by the Pfoas, Iliacus, and Pestineus.

The:

The Pfoas arises from the Internal side of the transverse Processes of the Vertebra of the Loins, within the Abdomen; and descending upon part of the Internal side of the Ilium, it is inserted into the lower part of the little Trochanter.

The Iliacus arises from the Internal Cavity of the Os Ilium; and descending, it joins with the former, with which it

is also inserted.

The Pettineus arises from the External part of the Os Pubis, and is inserted a little below the lesser Trockanter.

The Thigh is extended by the Glutaus

Major, Medius and Minor.

The Glutaus Major arises semicircularly from the Os Coccygis, the Spines of the Sacrum, from the Spine of the Ilium; and from a strong Ligament that runs between the Sacrum and Tubercle of the Ischium; and descending, its inserted into the Linea Aspera, four singers breadth below the great Trochanter.

The Glutaus Medius arises from all the Spine of the Ilium under the former, and is inserted into the Superiour and External part of the great Tro-

chanter.

The Glutaus Minor arises from the lower part of the External side of the Ilium, under the former, and is inserted at the Superiour part of the great Trochanter.

The Thigh is moved inwards, or they are both brought together by the Triceps which hath three Originations and three Insertions, and may be divided into three Muscles.

The first arises from the Os Pubis, and is inserted above the second into the Linea Aspera of the Thigh-Bone.

The second arises from the lower part of the Os Pubis, and is inserted about

the middle of the Linea Aspera.

The third arises from the Os Pubis, where it joins the Os Ischium, and is inserted from a little below the second to the Internal and lower Apophisis of the Thigh Bone: When they act, they pull the Thigh-Bone inwards, and turn it a little outwards.

The Thigh is turned outwards by the

the Quadrigemini.

The first is the Pyriformis, or Iliacus Externus; it arises round and slessly from the Inferiour and Lateral part of the Os Sacrum, and is inserted with

The fecond and third, call'd Gemini, which arise from the Protuberance of the Ischium, and are inserted with the first in the dent at the root of the great Trochanter.

The fourth is the Quadratus; it comes from the Protuberance of the Ischium, and is inserted into the outside of the great Trochanter.

The Thigh is moved circularly and obliquely when these Muscles act successively, but particularly by the two Obtaratores.

The Obturator Internus comes from the Internal Circumference of the Hole that is between the Ischium and Pubis; and passing through the Sinuosity of the Ischium, it is inserted into the dent of the great Trochanter. Its Tendon lies between the Gemini; it turns the Thigh to the outside.

The Obturator Externus comes from the External Circumference of the same Hole as the former: It embraces the Neck of the Thigh Bone, and passes under the Quadratus to the small Cavity

of the great Trochanter.

SECT. XI. Of the Muscles of the Leg.

THE Leg is bended by four Muscles, and extended by four others. The

Muscles which bend it, are,

The Semi-nervosus, which arises from the Protuberance of the Ischium, and is inserted by a round Tendon into the Internal part of the Epiphis of the Tibia.

The Semi-membranesus arises tendinous from the Protuberance of the Is-chium, immediately below the former,

and

and is inserted by a large Tendon into the

upper and back-part of the Tibia.

The Biceps, so called because it has two Heads, of which one comes from the tuberosity of the Ischium, the other from the middle of the Linea Aspera, both which join together, and are inserted by one Tendon into the Superiour and External part of the Perone.

The Gracilis arises from the union of the Os Pubis and Ischium, and descending by the inside of the Thigh, it grows tendinous, and is inserted into the Superiour and Internal side of the

Tibia.

The Leg is extended by four Muscles,

which are,

The Rectus; it arises from the lower part of the Spine of the Ilium, and defeending between the two following, it's inserted with them.

The Vastus Externus, which comes from the root of the great Trochanter,

and part of the Linea Aspera.

The Vastus Internus, which arises from the root of the lesser Trochanter.

The Crurens, which comes from the fore-part of the Thigh-Bone, between the great and leffer Trochanter, and lying close upon the Bone, it joins its Tendon with the three former, which all together make one broad Tendon, which passes over the Patella, and is inserted

inserted into the little Tuberosity on the upper and forepart of the Tibia.

The Leg is moved obliquely by three

Muscles.

The Longus or Sartorius; it arises from the Inferiour part of the Spine of the Ilium, and running obliquely by the inside of the Thigh, is inserted into the Internal side of the Tibia, three or sour singers breadth below its upper Extremity. By this Muscle we throw one Leg and Thigh cross another-

The Poplitans; it arises from the External and Inferiour Protuberance of the Thigh-Bone, and passing over the Joint obliquely, is inserted into the Superiour and Internal part of the Tibia. This assists in bending of the Leg, and turns

it a little inwards.

The Membranosus, or Fascia Lata, which arises slessly from the forepart of the Spine of the Ilium, and a little below it becomes membranous or tendinous, and covers almost all the Muscles of the Thigh and Leg down to the Foot. This Muscle helps in extending of the Leg, and turns the Leg a little outwards.

S E C T. XII. Of the Muscles of the Foot.

THE Foot is bended by the Tibialis.

The Tibialis Anticus arises flesh from the upper and forepart of the Tibia, and adhering to the External side of the Tibia, as it descends it passes under the Ligamentum Annulare, and is inserted into the Os Cuneiforme, which answers to the Great-Toe.

The Peronaus Anticus is joined to the Posticus at its Origination, which is from the upper and External half of the Perone; and running through the Chanel which is in the External Ankle, 'tis inferted into the Os Metatarsi that sustains

the Great-Toe.

The Foot is extended by four Muscles.

The first and second are the Gasterocnemius or Gemellus, which, with the Soleus, make the Calf of the Leg; the one arises from the back-part of the Internal Protuberance of the Thigh-Bone, the other from the same part of the External Protuberance of the same Bone: They have two large fleshy Bellies, which join and make one Tendon with the following, which is inserted into the Os Caleis.

The third is the Solens, which lies under the former; it arises from the upper and back-part of the Tibia and Perone; and descending, it joins its Tendon with the former. The Tendon of these three Muscles is big and strong, call'd Tendo

Achillis.

The fourth is the Plantaris; it has a fleshy Origination from the back-part of the External Protuberance of the Thigh-Bone; and descending a little way between the Gemellus and Solens, it becomes a long and slender Tendon, which marches by the inside of the great Tendon, and at the Sole of the Foot it is expanded into a large Aponeurosis, which has the same use, situation and connexion as that of the Palm of the Hand.

The Foot is moved fide-ways by two

Muscles.

The Tibialis Posticus, which arises from the Superiour and back part of the Tibia and Fibula, and Membrane that ties them together, and descending by the hind-part of the Tibia, it passes through the Fissure of the inner Ankle, and is inserted into the under side of the Os Naviculare; it moveth the Foot inwards.

The Peronaus Posticus arises from the Superiour and External part of the Perone; and descending, it passes through the Fissure of the external Ankle under the Sole of the Foot, to be inserted into the Os Metatars that sustains the Little-Toe. When this Muscle afteth, it pulleth the Foot outwards.

SECT. XIII.

Of the Muscles of the Toes.

THE four leffer Toes are bended, and extended, and moved fide-ways.

They are bended by the Perforans

and Perforatus.

The Perforans arises from the upper and back part of the Tibia, and passing under the inner Ankle, and Ligament that ties the Tibia and Os Calcis together, it divides into four Tendons, which pass through the Holes of the Perforatus, are inserted into the third Bones of each lesser Toe. There is a Massa Carnea that arises from the Os Calcis, and which joins the Tendons of this Muscle where the Lumbricales begin.

The Perforatus, or Flexor Brevis, arifes from the inner and lower part of the Os Calcis, and is inferted by four Tendons into the fecond Phalanx of each Toe. These Tendons are perforated to give way to the Tendons of the Perforans.

The Toes are extended by the Longus

and Brevis.

The Longus comes from the Superiour and External part of the Tibia, and from the upper part of the Fibula; and being divided into five Tendons, it passes under the Ligamentum Annulare, and is inserted into the third Bones of the lesser

Toes,

Toes, and into the Os Metatarsi that

fustains the Little-Toe.

The Brevis lies under the Tendons of the former, and arifes from the External and forepart of the Os Calcis, and is inferted by five Tendons into the second Phalanx of the Toes: These Tendons cut the Tendons of the former at acute Angles.

The four Lumbricales arise from the Tendons of the Perforans, and are inserted into the inside of the lesser Toes.

The eight Interoffei, which lie betwixt the Bones of the Metatarsus, have the same situation, use, origination and in-

fertion as those of the Hand.

The Abductor Minimi Digiti arises from the External part of the Os Calcis; and lying upon the outside of the Os Metatarsi, that sustains the Little-Toe, 'tis inserted into the upper part of the first Bone of the same Toe externally.

The Great-Toe is bended, extended, and

moved fide-ways by feveral Muscles.

The Flexor Pollicis Longus arises from the upper and back-part of the Fibula, and passing behind the inner Ankle, 'tis inserted into the last Bone of the Great-Toe.

The Flexor Pollicis Brevis; it arifeth from the Os Cuneiforme Medium, and is inferted into the Offa Sefamoidea upon the fecond Joint of the Great-Toe.

The Extensor Pollicis arises from near the upper half of the Perone forwardly; and passing under the Ligamentum Annulare, is inserted into the last Bone of the Great-Toe.

The Tenar, or Abducens Pollicis arises from the Os Calcis, and from the Os Cuneiforme Majus, and is inserted into the External side of the Os Sesamoides.

The Antitenar, or Adductor Pollicis, arises from the Inferiour part of the third Os Cuneiforme, and passing obliquely, is inserted into the inside of the Ossa Se-

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The Transversalis comes from the Bone of the Metatarsus that sustains the Toe next the Little-Toe, and passing a cross the other Bones, its inserted into the Os sesamoides of the Great-Toe: Its Use is to bring all the Toes close to one another.

A TABLE of the Muscles.

F Ront ales,

Occipitales,

They pull the Skin The Mufcles of of the Forehead the Forehead upwards.

They pull the Skin The Mufcles of the Forehead are one Pair.

They pull the Skin of the Hind. of the hind-Head Head one Pair. upwards.

Actollens | Auri-Deprimens | rum

Of the Ears

Internus

286 A Table of the Muscles. Internus Malleoli, It distends the Tympanum. Externus Malleoli, It relaxes the Tympanum, Obliquus Malleoli. Musculus Stapidis It moves the Stirrop. Of the Eye- Corrugator Superbrows, one Pair. Eye-lids, 1700 Rectus Palpebra Su. It lifts up the upper perioris. Eye-lid. Pair. Orbicularis Palpe- It shuts both Eyelids. brarum. Eyes, fix Pair. Attollens Deprimens (Ocalo-Abductor (rum. Adductor Obliquus Major, It pulls the Eye forwards, and obliquely downwards. Obliquus Minor, It pulls the Eye forwards, and obliquely upwards. Nose, three Attollens Pair. Dilatans Deprimens)

Lips, fix Pair, Incifious, and one fingle

Triangularis,

Caninus, Elevator Labij Inferioris, It pulls the Upper-Lip upwards. It pulleth it down-

It pulleth it downwards.

They pull the Lower-Lip upwards.

Quadra-

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Quadratus. It pulleth it downwards. It draws both Lips Zygomaticus. obliquely to either fide. It draws both Lips Orbicularis. together. It thrusts the Meat Of the Cheeks Buccinator, between our Teeth. one Pair. Temporalis,? They pull the Jaw Lower-Jaw, Masseter, 3 upwards. fix Pair. Pterigoidaus Inter- It draws the Jaw to either fide. MHS. Pterigoidans Exter- It draws the Jaw forwards. nus. It pulleth the Jaw Quadratus. and the Cheeks downwards. It pulleth the Jaw Digastricus, downwards. Peristaphilinus In- It pulls the Voula Uvula, two forwards. ternus. Peristaphilinus Ex- It pulls the Voula backwards. ternus. It draws the Tongue Tongue, three Styloglo [us, upwards. It pulls it out of Genioglossus, of the Mouth. Ceratoglo Jus, It pulls it into the Mouth.

Geniohyoideus, It Pulls Os Hyoides Os Hyoides, & Tongue upwards five Pair.

and forwards.
Sterno-

A Table of the Mufcles.

	Sternohyoidaus,	It pulleth the Os Hyoides down- wards.
**	Mylohyoidaus,	It pulls it obliquely upwards.
	Coracobyoidans,	It pulls it obliquely downwards.
	Stylehyoidaus,	It pulls it to either fide, and fome-what upwards.
Of the Pharynx, two Pair.	Siylo-Pharyngaus,	It pulleth up and dilateth the Pha-rynx.
	Oesophagaus,	It straitens the Pha-
P. iii.	Sternothyroidaus,	It pulls the Thyroi- des downwards.
	Hyothyroidsus,	It pulls the Thyroi- des upwards.
	Cricothyroidaus, Cricoarytænoidaus Posticus,	Tal. institution
	Cricoaryt cenoidaus Lateralis.	
	Thyroarytoenoidaus,	It dilates the Glot-
	Arytænoidaus,	It contracts the Glot-
Head, ten Pair-	Splenius, Complexus,	They move the Head backwards.
		They nod the Head backwards.

. biswood Data .

Obliquus Inferior, Sobliquus Superior, Maftoidæus, Rectus Internus Major, Rectus Internus Minor,

Rectus Lateralis,

Intercostales Internié Externi, Subclavius, Serratus Anticus Major, Serratus Posticus Superior,

Triangularis,
Serratus Posticus
Inferior,
Sacrolumbaris,

Diaphragma,

Obliquus Externus, Obliquus Internus, Transversalis, Rectus, Pyramidalis,

Obliquus Inferior, They perform the Obliquus Superior, Semicircular Mo-Mastoidaus, tion of the Head.

They nod the Head forwards.

It nods the Head to

They pull the Ribs of the Thoupwards in Inspi-rax, twentynine Pair.

They make the Motion of the Ribs downwards, in Expiration, the fwifter.

Its Use is both in Inspiration and Expiration.

They compress all Lower-Belly, the Parts contain-five Pairs, ed in the Lower-Belly; assist the Motion of the Ribs downwards in Expiration, and help to bend the Vertebra of the Loins forwards.

Longif-

A Table of the Mufcles. 290

bre, foven Pair.

of the Verte- Longissimus Dors, It keeps the Body erect.

Transversalis Dorfi, It moves the Body

obliquely backwards.

Inter-spinalis,

It draws the acute Processes nearer one another.

rum,

Quadratus Lumbo. It draws the Vertebra of the Loins to one fide.

Longus. Scalenus. Ploas Parvus. 7 They bend the Vertebra of the Neck. It helps to bend the

Vertebra of the Loins.

It draws up the Testicles in the act of Generation.

The Muscles Cremaster. of the Privities in Men are four pair.

Erectores Penis. Transversalis Penis, Acceleratores Uri-

Clitoris, one Erectores Clitoridis. pair.

Sphincter Vefica, One fingle Mufcle of the Bladder.

of the Anus, Levatores Ani. three Single Muscles. Sphineter Ani.

It contracts Neck ot the Bladder, that the Urine may not run continually.

They draw up the Anus.

It shuts the Anus. Serratus Serratus Anticus Minor, Trapezius,

Romboides, Levator Scapula,

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Deitoides,
Supra Spinatus,
Coracobrachialis,
Teres Major,
Latissimus Dorsi,
Pectoralis,

Infra Spinatus,
Transversalis,
Subscapularis,
Biceps.
Brachiaus Internus,
Longus,
Brevis,
Brachiaus Externus,
Anconaus,

Rotundus, Quadratus,

wir ing d

It draws the Shoul- of the Sho der-blade forwards. four pair.

It moves it upwards, backwards, and downwards. It pulls it backwards It pulls the Shoulder-blade upwards.

They lift the Arm Shoulderupwards.

Bones, nine pair.

They pull the Arm downwards. It moves the Arm forwards.

They draw the Arm backwards.

They bend the fore- Cubiti, fix Arm.

They extend the fore-Arm.

They perform the Radii, for Motion of Pro-Pair.

nation, or they turn the Palm of the Hand down-wards.

ur pair.

Longus, Of the Wrists, Cubit aus Inter-, nus. Radiaus Inter-Cubitans Externus. Radians Externus.

They perform the Motion of Supination, or they turn the Palm of the Hand upwards.

They bend the Wrift.

They extend the

of the Palms Palmaris. of the Hands, two pair.

Palmaris Brevis.

of the Fin- Sublimis. gers, fifteen Profundus. pair. Extensor Digitorum Communis.

Attack Sports Line

It helps the Hand to grasp any thing closely.

It makes the Palm of the Hand concave.

They bend the Fingers.

Lumbricales,

and the transfer.

Interoffei Interni, Interoffei Externi, They affift in bending the first Joint of the Fingers.

They draw the Fingers to the Thumb. They draw the Fin-

gers from Thumb.

Flexor

Flexor Pollicis Longus,
Flexor Pollicis Brevis,
Extensor Primi,
——Secundi,
——Tertii Internodii Pollicis.

The particula Muscles of the Thumbs are seven pair,

Tenar,

Antitenar,

Abductor Indicis, Extensor Indicis, It draws the Thumb from the Fingers. It draws the Thumb to the Fingers.

> Of the Forefingers, rme pair,

Hypotenar,

It draws the Little- of the Little Finger from the fingers, swe rest.

Extensor Auricula-

Psoas, Iliacus, Pettinaus, Glutaus Major, Glutaus Medius, Glutaus Minor,

They bend the The Muscles of the Thigh.

Thigh.

They bend the The Muscles of the Thigh are thirteen pair.

They extend the Thigh.

Triceps,

Pyriformis, Gemini, Quadratus, It pulls the Thigh

They move the Thigh outwards.

O 3 Obtu-

mus. Obturator Exter-

of the Legs, Semi-nervofus, eleven pair Semi-membrano-

Biceps, Gracilis. Rettus. Vastus Externus. Vaftus Internus, Crureus.

Obturator Inter- They help to move the Thigh obliquely, and circularly.

They bend the Leg.

They extend the

Sartorius.

Poplitans.

Membranosus,

of the Feet, Tibialis Anticus, eight pair. Peronaus Anti-Gasterocnemii. Solaus.

> Plantaris. Tibialis Posticus,

of the Toes, Profundus, menty-four Sublimis. Lumbricales.

It makes the Legs cross one another. It turns the Leg fomewhat inwards. It turns it a little outwards.

They bend the Foot.

extend Thev Foot.

It moveth the Foot inwards.

Peronaus Posticus, It moveth the Foot outwards.

> They bend the four lesser Toes.

> > Longus,

Longus, 3 They extend the Brevis, 5 four lesser Toes.

Flexor Pollicis, Extensor Pollicis, Tenar, It draws the Great-

Antitenar, Toe from the rest.

It draws it to the rest.

Flexor Pollicis Longus,

Brevis,

Abductor Minimi

Digiti,

Interossei Interni, They draw the Toes
to the Great-Toe.
Interossei Externi, They draw them
from the GreatToe.

Transversalis, It brings all the Toes close to one another.

In all 446 fingle Muscles in the Body.

that a part of the firefor the Coll.

A A MARTINE MAY ALL

of the description of the Constitution of

CHAP. VII.

Of the Nerves, Veins, and Arteries.

SECT. I.

Of the Nerves in General.

NERVE is a long and small bundle of very fine Pipes, or hollow Fibres, wrapt up in the Dura and Pia Mater; which last not only covers them all in common, but it also encloses every Fibre in particular-

The Medullary Substance of the Brain is the beginning of all the Nerves; and tis probable that each Fibre of the Nerves answers to a particular part of the Brain at one end, and to a particular part of the Body at its other end, that whenever an impression is made upon such a part of the Brain, the Soul may know that such a Part of the Body is affected.

The Nerves do ordinarily accompany the Arteries through all the Body, that the Animal Spirits may be kept warm, and moving, by the continual heat and pulse of the Arteries. They have also

Blood.

Blood-Vessels as the other Parts of the Body: These Vessels are not only spread upon their Coats, but they run also amongst their Medullary Fibres, as may be seen amongst the Fibres of the Retina. Where-ever any Nerve sends out a branch, or receives one from another, or where two Nerves join together, there is generally a Ganglio or Plexus either less or more, as may be seen at the beginning of all the Nerves of the Medulla Spinalis, and in many other places of the Body.

SECT. II.

Of the Nerves which come immediately out of the Skull.

THE Nerves are divided into those which come immediately out of the Skull, and those which come out between the Vertebra. The first fort come from the Medulla Oblongara, which has been already described, and they are ten Pair.

The first Pair are called Nervi Ol-Nervi Olfactorii; they arise from the basis of the factorii, Corpora Striata, and passing through the little holes of the Os Cribriforme, they are spread upon the Membrane which covers the Os Spongiosum.

The second are call'd Optici; they rise Optici partly from the Extremities of the Cor-

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pora Striata, and partly from the Thalami Nervorum Opticorum, which last they almost embrace; from thence approaching one another, they unite above the Cella Turcica, and immediately dividing again, they pals through the foremost holes of the Os Sphænoides into the Orbit, where piercing the Globe of the Eye, their Medullary Fibres are spread upon the glaffy Humour.

Oculorum Motores.

The third are called Oculorum Motores; they arise from the Medulla Oblong at a on each fide of the Infundibulum, and the Carotidal Arteries lie between them; from thence passing through the Foramina Lacera of the Os Sphonoides, they give a branch, which, with a branch of the fifth Pair, forms a confiderable Plexus, which fends out feveral twigs which embrace the Optick Nerve, and are spent on the Tunicles of the Eye: They give a branch to the Muscles call'd Attollers, Deprimens, and Obliques Minor of the Globe.

Pathetici.

The fourth Pair are call'd Pathetici. that rife from a small Medullary Cord that is behind the Testes; they go down upon the fides of the Medulla Oblongata, and paffing under the Dura Mater by the fides of the Cella Turcica, they go through the Foramina Lacera, and are wholly spent on the Obliquus Major.

The

The fifth Pair rife from the forepart The fifth Pairs of the Processus Annularis; they are the biggest Pair of the Brain; they give Nerves to the Dura Mater; each of them divides into three branches, of which the foremost is called Ramus Ophthalmicus, because it passes through the Foramen Lacerum into the Orbit, where it divides into two branches. The first fends out a branch which joins a branch of the Motores, and forms the Plexus Ophthalmicus. rest of this first branch passes over the Globe of the Eye, gives some twigs to the Glandula Lachrymalis, and goes out at the hole of the Os Frontis above the circumference of the Orbit, where it is .. diffributed in the Skin and Frontal Muscles. The second branch of the Ramus Ophthalmicus goes under the Muscle Superbus, and passes out at the hole call'd Orbiter Internus, and is distributed in the Internal Nose.

The second branch of the fifth Pair, which passes out at the third hole of the Os Sphænoides, divides into three branches, of which one pierces the hind-side of the Ox Maxillare, and gives twigs to the Teeth of the Upper Jaw; all the rest of it comes out at the hole in the fore-side of the same Bone, under the Orbit, and is distributed in the Cheeks and Nose. Another passes under the Processes Zymaticus.

gematicus, and is distributed in the Temporal Muscle; and the third is distributed in the Palate and Muscles of

the Pharynx.

The third branch of the fifth Pair paffes through another hole of the Os Sphænoides, and then it divides into two branches, the first of which is again divided into four branches, of which the first passes between the Condile and the Corone of the Lower-law to the Mulla-The fecond is diffributed in the Crotaphites. The third passes under the Processus Zygomaticus to the Buccinator, Glands of the Cheeks, and Upper-Lip. And the fourth passes from behind the Condile of the Lower-law, where it joins the Portio Dura over the Jaw, and is distributed in the Face. The second branch is divided into three others. The first passes between the Pterigoidaus Externus and the Internus; and towards the Angle of the Lower-law it fends out a branch which makes the Chorda Timpani, which goes also to the Muscles of the Malleolus, and then it joins the Portio Dura before it comes out of the Cranium; the rest is spread on the Chin. The fecond goes along the fides of the Tongue, and fends out feveral branches which join the ninth Pair. It gives also some twigs to the Giandula Sublinguales, to the Muscles of the Tongue and Os Hyoides.

Hyoides. The third goes to the Teeth of the Lower-Jaw by the Holes in its inside.

The fixth Pair of Nerves rife from The fixth Pair the fides of the Processus Annularis. This is a small Nerve which passes straight through the Foramen Lacerum, and is wholly spent on the Musculus Abducens. But a little before it enters the Orbit it casts back a branch which alone makes the Root of the Intercostal Nerve. It passes out of the Skull by the same passage the Carotidale Artery enters. As foon as it is come out of the Skull, it, with a branch of the tenth Pair, and of the first and second of the Vertebra of the Neck, forms a large Plexus call'd Cervicalis. Below this, it receives a branch made of a twig of the tenth Pair, and of the first of the Neck. As it descends, above the Musculus Scalenus, and below the eighth Pair, it receives a branch from each of the Vertebral Nerves. When it comes to the Clavicula, it divides into two branches. of which one passes above the Axillary Artery, and the other under it, and then they immediately join again; they, with a branch of the first Pair of the Back, form a pretty large Plexus at this place; and sometimes before (for it observes no regularity) it casts out a branch, which, with a branch of the eighth Pair, forms

the Plexus Cardiacus; then it goes down the Cavity of the Thorax, under the Pleura, near the Vertebra, and as it passes by, it receives a branch from every Pair of the Back, by which it grows bigger and bigger. As it goes out of the Thorax it divides into feveral branches, of which the three Superiour in the right fide form the Plexus Hepaticus, and in the left the Plexus Splenicus. These Plexus's turnish Nerves to the Kidneys, to the Pancreas, to the Cawl, to the lower part of the Stomach, to the Spleen, to the Liver, to the Mesentery, to the Intestines; and their branches form a large Net upon the Mesenterick Arteries, call'd Plexus Mesenterious. The inferiour branches, as they go down upon the Vertebra of the Loins, receive a branch from the first of the Loins, and they fend out branches which join those of the Superiour branches which go to the Guts, and which form the Net upon the Mesenterick Arteries. Then they go down into the Bason, and form a large Plexus above the streight Gut, to which it gives Nerves, as also to the Bladder, Vesicula Seminales Proftata in Men, and to the Womb and Vagina in Women.

Nervus Au-

The seventh Pair is the Nervus Auditorius; it arises from the hind-part of the Processus Annularis; it enters the hole in the inner Process of the Os Pe-

trofum ;

trosum: It divides into two branches; that which is soft is call'd Portio Mollis, and it is distributed into the Labyrinth Cochlea, and Membranes which cover the Cavities of the Ear. That which is hard, is call'd Portio Dura; it goes out of the Ear by that hole which is between the Processus Mastoides and Styloides; it divides into two branches, of which one goes to the Muscles of the Tongue, or Os Hyoides, and it gives a small branch to the eighth Pair. The other is distributed in the External Ear, Nose, Lips, and Cheeks.

The eighth Pair is the Par Vagum; it Par Vagum rifes from the fides of the Medulla Oblongata, behind the Processus Annularis, by feveral threads which join together. and go out by the fame hole that the Sinus Laterales discharge themselves into the Jugulares. It is joined by a branch of the Nervus Spinalis, or Accessorius Willifi, and by a small branch of the Portio Dura: Immediately after it comes out of the Skull, it gives a small branch to the Larynx, as it goes down the Neck, above the Intercostal Nerve. by the fide of the Internal Carotide. At the Axillary Artery it casts back the recurrent Nerves, of which the right embraces the Axillary Artery, and the left the Aorta. These two branches ascend on each fide of the Trachea Arteria to the

the Larynx, where they are spent on the Muscles of the Larynx and Membranes of the Trachea.

Then the eighth Pair, after it has entred the Cavity of the Thorax, sends out two branches, which, with the branches of the two Intercostals, form, a little above the Heart, between the Aorta and the Trachea, the Plexus Cardiacus, which gives a great number of small branches to the Pericardium and Heart, particularly very many creep along the Aorta to the left Ventricle. The eighth Pair gives also several branches to the Lungs, which accompanying the Bronchi, then it descends upon the Oesophagus, and is spread upon the Stomach, and some twigs go to the Concave fide of the Liver, as has been faid already.

With this Nerve it is usual to describe another which passes out of the Skull at the same hole with it. It is called Nervus Accessorius Williss; it arises from the Medula Spinalis, about the beginning of the sixth Pair of the Neck; as it ascends to the Head, it receives on each side a twig from the first sive Pair of Nerves of the Neck, as they rise from the Medulla Spinalis; then it enters the Skull, and passes out of it again with the eighth Pair, and is wholly spent upon

the Musculus Trapezius.

The

The ninth Pair rifes from the Processus Olivares of the Medulla Oblongara; it passes out of the Skull by its own proper hole in the Os Occipitis: As it passes to the Tongue, it gives some branches to the Muscles of the Os Hyoïdes, but its Trunk is distributed in the body of the Tongue, and its Extremities from the

Papille Rotunda of the Tongue.

The tenth Pair rifes by several small The tenth Pair threads from the beginning of the Medulla Spinalis; then ascending a little, it goes out at the same hole of the Dura Mater at which the Vertebral Artery enters, passing between the Protuberance of the Occiput and the first Vertebra, in the Sinus, which we have observed in this Vertebra: Then it gives a branch to the first Pair of the Neck which goes to the Plexus Cervicalis; it gives another to the second Pair, and a third to the Intercostal Nerve, and then it is all spent on the oblique Muscles of the Head.

SECT. III.

Of the Nerves which come out between the Vertebræ.

THE Nerves which come out between the Vertebra are thirty Pair; they arise from the Spinalis Medulla, which (as we have said before) is a continuation tinuation of the Substantia Medullaris or Medulla Oblongata of the Brain, contained in the great holes of the Vertebra. Its Internal Substance is mixed in several places with a Substance like the Cortical Substance of the Brain, (as Malpighins has observed.) From the first Vertebra of the Neck to the first of the Loins, it is divided by the Pia Mater into the right and left fide, not quite through its middle, but the depth of a Line or two in its fore and hind part. From the first of the Loins to its Extremity, it is divided into a great number of Fibres, which separate from one another, if they be shaken in warm Water. This Part, because of its resemblance, is call'd Cauda Equina; 'tis cover'd by four Membranes, of which the first is that which lines the great holes of the Vertebra. The second is the Dura Mater, which has two Sinus's, one on each fide of the Medulla; they reach from the Occiput to the last of the Os Sacrum. The third is the Pia Mater: And the fourth, call'd Arachnoides, is a very fine Membrane, which contains only the bundles of Fibres which make the Vertebral Nerves.

All the Nerves, as they rife out of the Medulla Spinalis, are, by the Pia Mater, divided into two Plans, which lie one above the other. And as soon as the

Nerves

Nerves are come out of the Vertebra, they fend a branch to one another, where

they make a little Ganglio.

The Nerves of the Vertebra are thirty Pair, seven of the Neck, twelve of the Back, five of the Loins, and six of the Os Sacrum; they come out at the holes in the sides of the bodies of the Vertebra, which have been taken notice of in the Osteology.

The first Pair of the Neck is spread of the Nerves in the Muscles of the Head and Neck; it of the Neck joins a branch of the tenth Pair, which goes to the Plexus Cervicalis, and it gives another branch to the Intercostal

Pair below the Plexus.

The second Pair of the Neck gives also Nerves to the Muscles of the Head and Neck, to the External Ear and Skin of the Face.

The third gives some branches to the Neck and Head; it sends out the Nervus Diaphragmaticus, being joined by a branch from the sourth Pair. This Nerve goes straight down the Cavity of the Thorax, and is spread on the Midriff.

The fourth, fifth, fixth and seventh give some branches to the Muscles of the Neck and Head; but their greatest branches, together with a branch of the first of the Back, enter the Arms. As soon as they enter, they join all together, and then they immediately divide

into

into five branches. The first and innermost goes all to the Skin which covers the inner and fore part of the Arm. The fecond goes down by the inner Protuberance of the Humerus, by the Benders of the Fingers; and in the Palm of the Hand it divides into five branches. of which one goes to each fide of the Little and Ring Finger, and the fifth to the External fide of the Middle-Finger. The third accompanies the Artery between the Sublimis and the Profundus, and divides also into five branches, of which one goes to each fide of the Thumb and Fore-Finger, and the fifth to the Internal side of the Middle-Finger. The fourth passes under the Biceps to the outer fide of the Arm, and Back of the Hand, to be distributed into the Fingers, as the foregoing. The fifth is fpent on the Muscles on the inside of the Arm. All these Nerves, except the first, give branches to the Muscles as they pass by.

Of the Nerves

The first Pair of the twelve Pair of the Backgives a branch (as is said) to the Arms. The twelfth Pair is dispersed in the Muscles of the Lower-Belly, and all the rest run along the Sinus in the under side of each Rib, giving Nerves to all the Muscles that lie upon the Ribs and Vertebra.

of the Loins. give Nerves to the Muscles of the Lower-

Belly,

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Belly, to the Inguen, to the Yard, and to the Parts contained in the Bason. The third and tourth give some branches to these same Parts, but their trunks join and make the Nervus Anterior Femoris, which is dispersed in the fore part of the Thigh. This Nerve sends a branch through the hole in the Ischium, which is spent in the Triceps. The last of the Loins, with a branch of the sourth, enter the Thigh.

The Nerves of the Os Sacrum come of the Nerves not out at the holes on its backfide, but of the Os Saat those in its foreside; and the last crum. comes out between the Extremity of

the Sacrum and the Os Coccygis.

The first four Pair of the Os Sacrum give fome twigs to the Parts in the Bason; but their great branches, with the last, and a branch of the fourth of the Loins, make the Nervus Sciaticus, which is the greatest Nerve in the whole Body. As this Nerve passes between the Gracilis Posterior and the Semi membranosus, it gives a branch to the Skin. When it comes to the Ham. it divides in two, of which one goes along the Perone to the upper part of the Foot, and gives a branch to both fides of each Toe. The other paffes under the Gemelli by the inner Ankle, and is distributed in like manner to the Toes in their under fides.

The fifth and fixth of the Os Sacrum are very small, they are dispersed in the Sphincter, and Bladder, and Natural Parts.

SECT. IV.

Of the Arteries in General.

THE Arteries are Conical Chanels which convey the Blood from the Heart to all the Parts of the Body.

Each Artery is composed of three Coats, of which the first seems to be a Web of fine Blood-Vessels and Nerves, for the nourishing of the Coats of the Artery. The fecond is made up of Circular, or rather Spiral Fibres, of which there are more or fewer Strata, according to the bigness of the Artery. These Fibres have a strong Elasticity, by which they contract themselves with some force, when the power by which they have been stretched out ceases. The third and inmost Coat is a fine, dense, transparent Membrane, which keeps the Blood within its Chanels, which otherwise, upon the dilatation of the Artery, would eafily separate the Spiral Fibres from one another. As the Arteries grow imaller and imaller, fo these Coats grow thinner, and the Coats of the Veins feem to be only a continuation of the Coats of the Capillary Arteries. The 4774

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The Structure of the Arteries being thus premised, it will be easie to account for their Pulle. When the Left Ventricle of the Heart contracts and throws its Blood into the Great Artery, the Blood in the Artery is not only thrust forwards towards the Extremities, but the Chanel of the Artery is likewise dilated; because Fluids, when they are pressed, press again to all hands, and their pressure is always perpendicular to the fides of the Containing Vessels; but the Coats of the Artery, by any small impetus, may be distended: Therefore, upon the contraction of the Heart, the Blood from the Left Ventricle will not only press the Blood in the Artery forwards, but both together will distend the fides of the Artery. When the impetus of the Blood against the sides of the Artery ceases, that is, when the Lest Ventricle ceases to contract, then the Spiral Fibres of the Artery, by their natural Elasticity, return again to their former state, and contract the Chanel of the Artery, till it is again dilated by the Systole of the Heart. This Diastole of the Artery is called its Pulse, and the time the Spiral Fibres are returning to their natural state, is the distance between two Pulses. This Pulse is in all the Arteries of the Body at the same time time; for whilft the Blood is thrust

thrust out of the Heart into the Artery, the Artery being full, the Blood must move in all the Arteries at the fame time; and because the Arteries are Conical, and the Blood moves from the Basis of the Cone to the Apex, therefore the Blood must strike against the sides of the Vessels, and consequently every point of the Artery must be dilated at the same time that the Blood is thrown out of the Left Ventricle of the Heart : and as foon as the Elasticity of the Spiral Fibres can overcome the impetus of the Blood, the Arteries are again contracted. Thus there are two Caules, which operating alternately, keep the Blood in a continual motion, viz. the Heart, and Fibres of the Arteries: but because the one is Rronger than the other, therefore, though the Blood runs continually, yet when an Artery is open'd, it is feen to move per Saltum. Scient Pioces of the Artery, of their na-

in the control of the Cot. V. 10 Bell land

Of the Trunk of the Aorta Ascendens.

As all the Blood of the Body passes through the Heart, so all is conveyed by the Branches of the Aorta, or Great Artery, to the several Parts of the Body, in the Order we are now to describe.

The

At the bending of the Elbow this fame Trunk divides into two Branches, the one External, and the other Internal.

The External runs along the Radius, it calts out a Branch which goes to the Supinator, and ascends to the Brachialis Internus, in the rest of its course down to the Wrist, it gives Branches to the Longus Rotundus, and Benders of the Fingers, Wrist, and Thumb. Being come to the Wrist, it sends out a Branch which goes to the beginning of the Tenar, then it passes under the Tendon of the External part of the Hand, and passing under the Tendons of the Muscles, its Branches run along each side of the Thumb and Fore-singer.

The Internal Branch goes down along the Cubitus to the Wrist, and is distributed in like manner to each side of the Middle singer, Ring-singer, and Little-

Finger.

SECT. VI.

adiole, which early the Ele

Of the Aorta Descendens.

THE Aorta Descendens sends out first the Bronchialis of M. Ruysch, which accompanies all the Branches of the Bronchi. As it descends along the Vertebra of the Thorax, it sends out on P 2

each fide the Intercostal Arteries. To the Diaphragma it gives the Phrenica; and the Caliaca is the first it fends out when it enters the Abdomen. The Caliaca divides into two Branches, the one on the right, the other on the left, of which the first gives the Gastrica Dextra which goes to the Stomach, the Ciffica to the Gall-Bladder, the Epiplois Dextra to the Omentum, the Intestinalis to the Intestine Duedenum, and to a part of the Jejunum, the Gastro Epiplois to the Stomach, to the Omentum, and some branches to the Liver, which enter the Capfula Communis, to accompany the branches of the Vena Porta.

The left Branch of the Caliaca gives the Gastrica Dextra, which is also spread on the Stomach, the Epiplois Sinistra to the Omentum, and the Splenica to the

Substance of the Spleen.

Then the Aorta Descendens sends out the Mesenterica Superior, the Renales or Adiposa, which go to the Glandula Renales, and Fat about the Reins, the Emulgents to the Reins; the Spermatica to the Testicles, the Lumbares Inseriores to the Muscles of the Loins, the Mesenterica Inserior, which, with the Superiour, is distributed through all the Mesenterium, and which accompanies all the branches of the Vena Meseraica. When the Aorta is come to the Os Sacrum, it divides

divides into two great Branches; and from the Angle they make, springs out a finall Artery call'd the Sacra, because it is spread upon the Os Sacram. The Iliack Arteries divide again into the Ex-

ternal and Internal Iliacks.

From the Internal Iliack arifes the Hypogastrica; 'tis distributed to the Bladder, to the Rectum, to the outer and inner fide of the Matrix, Vagina, Veficula Seminales, Prostata, and Penis, to the Os Sacrum, and to all the Parts contained in the Pelvis or Bason; then it gives two confiderable Branches which go out of the Lower Belly. The first passes under the Priformis, and is distributed to the Muscles call'd Glutai. The fecond, which is lower than the first, gives also two Branches pretty big, of which the first goes to the Obturatores, the second pierces the Cavity of the Abdomen, under the Pyriformis, and loses it self by several Branches in the Glutaus Major.

As foon as the External Iliack leaves the Cavity of the Abdomen, it sends out the Epigastrica, which runs up the inside of the Musculus Rectus; and a little below that, the Pudenda, which goes to the Privities. Then it is called Cruralis, which sends out three considerable Branches.

The first is called Muscula, which gives several Branches. The first passes

between the Muscles call'd Iliacus and Pestineus, and loses it self in the third Head of the Triceps in the Semi-membranosus or Semi-nervosus, in the beginning of the Biceps, in the Quadrigemini, and in the Cavity of the great Trochanter.

The second, third and fourth go to several parts of the Triceps and Gracilis

Posterior.

Then the Trunk of the Muscula goes under the first of the Triceps, and divides

into three Branches more.

The first having pass'd the third of the Triceps, is lost in the Semi-membranosus. The second passes under the Femur to the Vastus Externus. The third goes a little lower, casts Branches to the Tendon of the third of the Triceps; it loses it self at the end of the Seminervosus, and at the end of the great Head of the Biceps.

The second considerable Branch of the Trunkot the Crural goes to the External part of the Thigh, passes under the Sartorius, under the Gracilis Rectus; it casts some Branches to the end of the Jilacus, to the beginning of the Gracilis Rectus, to the Vastus Externus, Cruralis, Membranosus, and torepart of the Glutaus Minor.

The third rifes almost from the same part of the Crural, and loses it self in the middle of the Gracilis Rectus, Cruralis, and Valtus Externus.

The

The Crural baying fent our thefe three Branches, gives feveral Branches to the Sartonius to the Gracilis Posterior but the greatest goes to the Vastus Emernus and

As the Crucal descends, it finles the deeper in the hind part of the Thigh, passing through the Tendons of the Fria ceps being come to the Ham, the first Branch it fends out is foread on the hind part of the Thigh-Bone, and it goes to the little Head of the Bireps; then it casts our feveral other Branches, which lose themselves in the Fat, and in the Extremities of the Muscles behind the Femur. Under the Ham it fends out two Poplitea, which go round the Knee, the one in the infide, the other in the outfide. It casts out, a little lower, several other Branches, of which some go to the beginning of the Gemini, of the Solens, Plantaris, and Poplitans, and the rest furround the Tibia on all sides.

Then it divides into two Branches, of which the first passes through the Membrane which joins the Tibia and Perone together, upon which it continues its way, giving Branches to the Tibians Externus. and to the Extensores Digitorum,

The second Branch divides into two more, the one External, the other Internal.

The External, after it hath given Branches to the Solens, to the Penensus Postarion and to the Flever Pollicia, Vierus.

P 4

pierces the Membrane between the Tibia and Perone; rifes upon the External Ankle, to spread it felf upon the upper part of the Foot, had sits or each distant

The Internal, as it descends, gives Branches to the Solens to the Flexores Digitorum, to the Tibiens Posterior; then it passes by the Cavity of the Perone, where it divides into two Branches, of which one passes under the Tenar to the Great Toe, the other paffes between the Museulus Brevis and the Hypotenar, and is distributed into the other three Toes.

This is the Order and Diffribution of the principal Arteries in the Body, each of which are subdivided into others, and thefe again into others, till at last the whole Body is over-foread with most minute Capillary Arreries, concerning which there are two things remarkable. First, That the Branches which go off at any small distance from the Trunk of an Artery, unite their Chanels into one Trunk again, whose Branches likewife communicate with one another, and with others, is before. By this means, when any fmall Artery is obstructed, the Blood is brought by the communicating Branches to the Parts below the Obstruction, which must otherwise have been deprived of their Nourishment, These Inosoularions are apparent every where, but chiefly in the Dierces Userus.

Oterns, Mesentery, and Brain. It is the

same thing with the Veins.

The other thing is, That the Summ of the Orifices of the Branches of any Artery is greater than the Orifice of the Trunk from which they came; and upon this consideration, the Velocity of the Blood is mightily diminished as it removes from the Heart. The Proportions the Primary Branches bear to one another, and the Aerta to the Cava and Pulmonary Artery, are as follow.

The Aorta and additions and	100000	
Right Subclavian Artery	20101.9	
Left Carotide	10016	
Left Axillary	14456.7	
Bronchial Artery	434.2	
24 Intercostals, each 434.2,	10420.8	
Cæliack	4830.3	
Mesenterick	7307.8	
Right Emulgent	4639	
Left Emulgent	4639	
Inferiour Mesenterick	3015	
6 Lumbals, each 434.2,	2605.2	
Lett Iliack	9739.8	
Right Iliack	10535	
The Summ of all the Branches	102740.7	
The Pulmonary Artery	139191.8	
The Ascending Cava	92373	
The Descending Cava	92373	
and of sing flories, there are	STATE OF STATE	

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SECT. VII.

Of the Veins in General.

THE Veins are only a Continuation of the extreme Capillary Arteries, reflected back again towards the Heart, and uniting their Channels as they approach it, till at last they all form three large Veins, the Cava Descendens which brings the Blood back from all the Parts above the Heart; The Cava Ascendens which brings the Blood from all the Parts below the Heart; and the Porta which carries the Blood to the Liver.

The Coats of the Veins are the same with those of the Arteries, only the Muscular Coat is as thin in all the Veins, as it is in the Capillary Arteries; the pressure of the Blood against the sides of the Veins being less than that against the

fides of the Arteries.

In the Veins there is no Pulse, because the Blood is thrown into them with a continued Stream, and because it moves from a narrow Chanel to a wider.

The Capillary Veins unite with one another, as has been faid of the Capil-

lary Arteries.

In all the Veins which are perpendicular to the Horizon, excepting those of the Uterus and of the Porta, there are small

finall Membranes or Valves; sometimes there is only one, fornetimes there are two, and fometimes three placed together, like to many half Thimbles stuck to the fides of the Veins, with their mouths towards the Heart. In the motion of the Blood towards the Heart, they are pressed close to the sides of the Vein ; but if the Blood should fall back, it must fill the Valves; and they being diffended, flop up the Chanel, to that no Blood can repais them.

times from the Cava Alcendens.

Of the Cava Descendens, or Superior.

TOR the more easie describing of the Veins, I shall begin at their Trunks, and proceed to their Branches contrary to the Motion of the Blood in them, and first of the Cava Descendens, or that in which the Blood returns from all the

Parts above the Heart of doing done !!

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The Trunk of the Cava Descendens joins the Trunk of the Cava Ascendens, and both together open into the Right Auricle of the Heart. On the Infide of the Vein where the Trunks join, there is a small Protuberance, which hinders the Blood that comes from the upper parts, from falling upon that from the inferiour parts, but diverts both

Of the Cava Descendens, &c.

24

both into the Auricle. Where the Cava Descendens joins the Auricle, it receives the Coronary Vein of the Heart.

As foon as it pierces the Pericardium, it receives the "Acupe or Vena fine Pari; this Vein runs along the right fide of the Vertebra of the Thorax, and is made by the union of the Veins of the Ribs on each fide. Its small end, at the Diaphragma, is divided into two Branches, which communicate with a Vein, sometimes from the Emulgents, and sometimes from the Cava Ascendens.

The Cava Descendens receives next the Intercostalis Superior, which is distributed in the Interclices of the four first Ribs, to which the Azygos comes not. Remark, That the Branches both of the one and the other run in the Sinns's which are on the lower sides of the Ribs.

Sanmichellius hath observed, that the Trunk of the Cava Descendens receives a Branch call'd Pneumonica; its this Branch which accompanies the Arteria Bronchialis of M. Rnysch.

and barai sogether open into the Right.
Charielesch the gifeatr, yr On the friide
oft aller Ven richterathe d'unde join.

upper party, from failted upon that

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Of the Venæ Subclaviæ, Jugulares, and their Branches.

THE Trunk of the Cava Descendens, as soon as it comes to the Clavicule, where it is sustained by the Thymus, is divided into two Branches, the one goes to the right, the other to the left; they are call'd Subclavie, which receive several other Branches.

The first is the Mammaria, which comes sometimes into the Cava, before it divides into the Subclavia; this Vein is distributed in the Breasts, and frequently it goes lower, and makes an Anastomosis with some Branches of the Epigastrica.

The second is the Mediastina, which is ordinarily one opening into the Trunk of the Cava; it goes to the Mediastinum

and Thymus.

The third is the Cervicalis or Vertebralis, which goes up the Vertebra of the Neck, and casts some Branches by

the by to the Medulla Spinalis.

The fourth is the Muscula Inferior, which comes sometimes into the Jugulars, 'tis distributed through the Inferiour Muscles of the Neck, and the Superiour of the Breast. The Branch that answers

answers this is call'd Muscula Posterior, because 'tis distributed in the Muscles which are in the hind-part of the Neck.

After that the Rami Subclavii are come out of the Cavity of the Breast, they are called Axillarer; they receive the Scapalaris Internal and External which goes to the Muscles of the Scapala, and to the Glands in the Arm-pits. Then they are divided into two Branches; the Superiour is call d Cophalica, and the Interiour Basilica.

Into the Basilica open the Theracica Superior, which goes to the Dugs and Muscles of the Breast. The Theracica Inferior, which spreads it self upon the side of the Breast, by several Branches which communicate by Anastomosis with the Branches of the Azygos, under the Muscles of the Breast.

The Subclavii receive also the Jugatures Externi & Interni, which go to

the Head.

The Jugulares Externi ascend towards the Ears, where they divide in two Branches, the one Internal, the other External. The Internal goes to the Muscles of the Mouth and of the Os Hyoides. The External lying upon the Parotides, divide into two Branches, of which one is spread through all the Face, and the Branches of the one side unites with

with those on the other side, and form the Vena Frontis: The other Branch goes to the Temples and hind Head.

The Jugulares Interni ascend to the Basis of the Cranium, where they are divided into two Branches, of which the greatest open into the Sinus Laterales of the Dura Mater by the Holes through which the eighth Pair of Nerves come out; the least goes to the Pia Mater, by the Hole which is night the Cella Turcica.

fourth Branch of Nerves that goes to the Arm. The second is TaOaBox Conduction

Of the Veins of the Arms and Hands.

THE Basilica and Cephalica are the two principal Veins of the Arms and Hands

The Cephalica creeps along the Arm, between the Skin and the Muscles; it divides into two Branches.

The External Branch goes down to the Wrist, where it joins the Bashiea, and turns up to the Back of the Hand, where it gives a Branch which makes the Salvitella, between the Ring-Finger and the Little-Finger. The Ancients used to open this Vein in Diseases of the Head, in continued and intermitting Fevers; but the Moderns approve not of this particular Practice; fince the know-

knowledge of the Circulation of the Blood, there is no difference whether one be Blooded in the Cephalica, Mediana, or Basilica.

The Internal Branch of the Cepbalica, together with a Branch of the Basilica,

makes the Mediana,

The Bafilica, which is the Inferiour Branch of the Axillarit, divides into three Branches under the Tendon of the Musculus Pettoralis.

The first Branch accompanies the fourth Branch of Nerves that goes to

the Arm.

The fecond is call'd Profundus; it reaches below the Elbow, where it divides into two branches; The one External, which goes to the Thumb, the Fore-finger, and to the Musculi Extenfores Carpi; The other Internal, which goes to the Middle-finger, to the Ringfinger, to the Little-finger, and to the inner Muscles of the Hand.

The third Branch is call'd Subcutanews, towards the inner Condyle of the
Arm; it divides into the Ramus Anterior
and Posterior: The first goes under the
Muscles of the Ulna to the Little finger,
where it joins a branch of the Cephalica;
the second, near to the Elbow, sends
out a branch which goes to the Wrist;
then it unites with the Cephalica Interior,
and forms the Mediana.

The

The Mediana, which is made of the Cephalica Interior, and the fecond branch of the Ramus Subcutaneus of the Basilica, divides into two branches upon the Radius; the one External, call'd Cephalica Pollicis, which runs between the Thumb and the Fore finger. The other Internal, which goes between the Ring finger and the Middle finger, and fometimes between this last and the Fore-finger. musing and no bus times culture latt branch of the dame

SECTE XIGHT MES

Of the Trunk of the Cava Ascendens, on to viva or Interior.

THE Trunk of the Cava Ascendens. between the Heart and the Diaphragma, does not lie upon the Vertebra, but runs at a small distance from them. At the Diaphragma it receives the Phreniea or Diaphragmatica. When it has pierced the Diaphragma, it receives some large branches from the Liver; then the Cava Ascendens accompanies the Great Artery from the Liver to the fourth Vertebra of the Loins, where it divides into two great branches call'd Iliaci; but before this division, it receives four branches from each fide o only sendonand

The first is the Vena Adipofa, or Renalis, which is foread on the Coap and

Fat that covers the Reinston's basics at

bien.

The second is the Vena Emulgens, which goes to the Kidney, where it divides into several more branches.

The third is the Kena Spormatica, of

which we have already fooken.

The fourth is the Vena Lumbaris, which is not always one, but often two or three on each fide, which they divide into Superiour and Interiour; they are bestewed on the Muscles of the Loins, and on the Peritonaum. They sometimes call the last branch of the Lumbaris, Muscula Superior.

There are some Anatomists that have observed, that there is a branch of the Lumbaris that enters the Cavity of the Vertebra and which ascends to the Brain; which gave them occasion to think, against all probability, that the Seed defeended by that Vein from the Brain.

A little below the Emulgents, the great Artery goes above the Cava; and then the Cava divides into two branches call'd Iliaci, because they pass above the Ilia to go to the Thighs. Near this division they receive one or two branches call'd Vena Sacra; they go the Medulla of the Os Sacram.

Then the Vene Iliaca divide into two branches, the one Internal, the other External. The Internal receives two branches, the Muscula Media, which is spread through the Muscles of the Thigh,

Thigh, the Hypogastrica, which is sometimes double, it's spread about the Sphinter of the Anus; wherefore 'tis called their Hamorrhoidatis Externa. The Hypogastrica is spread also upon the Body of the Bladder, upon the Matrix and its Neck.

The External branch of the Iliace receives three branches, two before it goes out of the Peritonaum, and the

third after it goes out of it.

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The first is the Vena Epigastrica, which comes rarely into the Cruralis, it goes to the Peritonaum, ascends to the Musculi Recti, where it Rencontres the Mammaria, with which it communicates by Anastomosis.

The second is the Vena Pudenda, 'tis spread upon the Parts of Generation.

The third is the Muscula Inferior, it goes towards the Articulation of the Femur, and is distributed to the Muscles of this Part.

The Iliaca Exterior, after it hath received all these branches, takes the name Cruralis, and then receives six branches more.

The first is the Vena Saphena, which goes down under the Skin along the inside of the Thigh and Leg, accompanied with a Nerve which loses it self at the inner Ankle. The Saphena turns towards the upper Part of the Foot, where

where it gives feveral branches, of

which some go to the great Toe.

The fecond is the Iscias Minor, this Vein is little; it is spent on the Muscles and Skin which are about the upper

Joint of the Femur.

The third is the Muscula Externa, because it goes to the External Muscles of the Thigh, on the other side of the Cruralis, just opposite to the beginning of this Vein, there goes out another called Muscula Interna, which goes to the Internal Muscles of the Thigh.

The fourth is the Poplitan made of two different branches united together; it goes straight down by the Ham to the Heel; it lies pretty deep, upon which account it can hardly be opened. The branches which appear in this

place are not of this Vein.

The fifth is the Suralis, which is pretty big, and which divides into two branches, the one External which is least, the other Internal which is higgest. Each of these branches divide again into two more; the one External, the other Internal.

The Suralize distributes its branches upon the fat of the Leg, and makes with the branches of the Poplitan, all those Plexus of Veins which are conspicuous, on the upper Part of the Foot.

The

The fixth and last branch of the Cruralis is the Iscias Major, which goes also to the Muscles and Fat of the Leg, and is divided afterwards into several branches, which are distributed to the Toes.

SECT. XII.

Of the Vena Porta.

Thus we have described the Veins which come from all the Parts of the Body, except the Stomach, Spleen, Pancreas, Omentum, and Intestines, from which Parts the Blood is carried by the Branches of the Porta to the Liver, to be returned by the branches of the Cava in the Liver, after that the Bile has been separated from it, (as has been said in the Section of the Liver.)

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The Vena Porta was so called by the Ancients, because they thought that it brought the Chyle by its Meseraick Branches from the Intestines to the Liver, through whose Substance 'tis spread. As it rises out of the Liver, it receives two small Veins from the Vesica Fellis call'd Cystica Gemella, one from the Stomach, call'd Gastrica Dextra; then advancing a little to the left, its trunk divides into two branches, of which the least, call'd Ramus Spienicus,

goes

goes to the left Hypochondrium: And the greatest called Mesentericus goes to the right. The Ramus Splenicus so called, because it carries the Blood from the Spleen, receives two branches called Gastrica Minor & Major, which are spread through all the Stomach. A branch of the Gastrica Major makes the Coronaria Stomachica at the upper Orifice of the Stomach. It receives three branches more, two from the Omentum and Colon, and the third from the Pancreas.

Then the Splenicus divides into two branches; the one Superior, the other

Inferior.

The Superior receives the Vas Breve, and some other branches which come

from the Spleen.

The Inferior receives two branches, viz. The Epiplois Sinistra, which is spread through the back part of the Omentum, and that Part of the Colon which is under the Stomach. The other branch is the Gastro-Epiplois Sinistra, which is also spread upon the Omentum and upon the Stomach; it makes sometimes the Vena Hamorrhoidalis Interna. The rest of this Inferior branch comes from the Substance of the Spleen.

The right branch of the Porta called Vena Mesenterica, before it divides, receives the Gastro-Epiplois Dextra, which is spread in the Omentum and lower

Part

Part of the Stomach; as also the Intestinalis, which comes from the Duodenum, and the Jejunum; it receives some branches from the Omentum and Pan-

Then the Mesenterica divides into three great branches, which run betwixt the Duplicature of the Mesente. rium, two of them come from the right fide which divide into fourteen branches, and these are again divided into an infinity of others less which are called Meseraica; they creep upon the Jejunum, Ilium, Cacum, and Part of the Colon.

The third and last branch of the Vena Mesenterica, is spread through the middle of the Mesenterium, to that Part of the Colon which is on the left fide, to the Rectum, down to the Anus, where it forms the Hamorrhoidales Interna. Control of the Resident

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